(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
15 April 2004 (15.04.2004)

PCT

(10) International Publication Number
WO 2004/030615 A2

(51) International Patent Classification[7]: A61K

(21) International Application Number:
PCT/US2003/028547

(22) International Filing Date:
29 September 2003 (29.09.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/414,971   2 October 2002 (02.10.2002)   US

(71) Applicant (for all designated States except US): GENEN-TECH, INC. [US/US]; 1 DNA Way, South San Francisco, CA 94080-4990 (US).

(72) Inventors; and
(75) Inventors/Applicants (for US only): WU, Thomas, D. [US/US]; 41 Nevada Street, San Francisco, CA 94110 (US). ZHANG, Zemin [US/US]; 876 Taurus Drive, Foster City, CA 94404 (US). ZHOU, Yan [CN/US]; #111, 525 N Curtis Avenue, Alhambra, CA 91801 (US).

(74) Agents: KRESNAK, Mark T. et al.; c/o Genentech, Inc., MS49, 1 DNA Way, South San Francisco, CA 94080-4990 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: COMPOSITIONS AND METHODS FOR THE DIAGNOSIS AND TREATMENT OF TUMOR

(57) Abstract: The present invention is directed to compositions of matter useful for the diagnosis and treatment of tumor in mammals and to methods of using those compositions of matter for the same.

COMPOSITIONS AND METHODS FOR THE DIAGNOSIS AND TREATMENT OF TUMOR

FIELD OF THE INVENTION

The present invention is directed to compositions of matter useful for the diagnosis and treatment of tumor in mammals and to methods of using those compositions of matter for the same.

BACKGROUND OF THE INVENTION

Malignant tumors (cancers) are the second leading cause of death in the United States, after heart disease (Boring et al., *CA Cancel J. Clin.* 43:7 (1993)). Cancer is characterized by the increase in the number of abnormal, or neoplastic, cells derived from a normal tissue which proliferate to form a tumor mass, the invasion of adjacent tissues by these neoplastic tumor cells, and the generation of malignant cells which eventually spread via the blood or lymphatic system to regional lymph nodes and to distant sites via a process called metastasis. In a cancerous state, a cell proliferates under conditions in which normal cells would not grow. Cancer manifests itself in a wide variety of forms, characterized by different degrees of invasiveness and aggressiveness.

In attempts to discover effective cellular targets for cancer diagnosis and therapy, researchers have sought to identify transmembrane or otherwise membrane-associated polypeptides that are specifically expressed on the surface of one or more particular type(s) of cancer cell as compared to on one or more normal non-cancerous cell(s). Often, such membrane-associated polypeptides are more abundantly expressed on the surface of the cancer cells as compared to on the surface of the non-cancerous cells. The identification of such tumor-associated cell surface antigen polypeptides has given rise to the ability to specifically target cancer cells for destruction via antibody-based therapies. In this regard, it is noted that antibody-based therapy has proved very effective in the treatment of certain cancers. For example, HERCEPTIN® and RITUXAN® (both from Genentech Inc., South San Francisco, California) are antibodies that have been used successfully to treat breast cancer and non-Hodgkin's lymphoma, respectively. More specifically, HERCEPTIN® is a recombinant DNA-derived humanized monoclonal antibody that selectively binds to the extracellular domain of the human epidermal growth factor receptor 2 (HER2) proto-oncogene. HER2 protein overexpression is observed in 25-30% of primary breast cancers. RITUXAN® is a genetically engineered chimeric murine/human monoclonal antibody directed against the CD20 antigen found on the surface of normal and malignant B lymphocytes. Both these antibodies are recombinantly produced in CHO cells.

In other attempts to discover effective cellular targets for cancer diagnosis and therapy, researchers have sought to identify (1) non-membrane-associated polypeptides that are specifically produced by one or more particular type(s) of cancer cell(s) as compared to by one or more particular type(s) of non-cancerous normal cell(s), (2) polypeptides that are produced by cancer cells at an expression level that is significantly higher than that of one or more normal non-cancerous cell(s), or (3) polypeptides whose expression is specifically limited

1

to only a single (or very limited number of different) tissue type(s) in both the cancerous and non-cancerous state (e.g., normal prostate and prostate tumor tissue). Such polypeptides may remain intracellularly located or may be secreted by the cancer cell. Moreover, such polypeptides may be expressed not by the cancer cell itself, but rather by cells which produce and/or secrete polypeptides having a potentiating or growth-enhancing effect on cancer cells. Such secreted polypeptides are often proteins that provide cancer cells with a growth advantage over normal cells and include such things as, for example, angiogenic factors, cellular adhesion factors, growth factors, and the like. Identification of antagonists of such non-membrane associated polypeptides would be expected to serve as effective therapeutic agents for the treatment of such cancers. Furthermore, identification of the expression pattern of such polypeptides would be useful for the diagnosis of particular cancers in mammals.

Despite the above identified advances in mammalian cancer therapy, there is a great need for additional diagnostic and therapeutic agents capable of detecting the presence of tumor in a mammal and for effectively inhibiting neoplastic cell growth, respectively. Accordingly, it is an objective of the present invention to identify: (1) cell membrane-associated polypeptides that are more abundantly expressed on one or more type(s) of cancer cell(s) as compared to on normal cells or on other different cancer cells, (2) non-membrane-associated polypeptides that are specifically produced by one or more particular type(s) of cancer cell(s) (or by other cells that produce polypeptides having a potentiating effect on the growth of cancer cells) as compared to by one or more particular type(s) of non-cancerous normal cell(s), (3) non-membrane-associated polypeptides that are produced by cancer cells at an expression level that is significantly higher than that of one or more normal non-cancerous cell(s), or (4) polypeptides whose expression is specifically limited to only a single (or very limited number of different) tissue type(s) in both a cancerous and non-cancerous state (e.g., normal prostate and prostate tumor tissue), and to use those polypeptides, and their encoding nucleic acids, to produce compositions of matter useful in the therapeutic treatment and diagnostic detection of cancer in mammals. It is also an objective of the present invention to identify cell membrane-associated, secreted or intracellular polypeptides whose expression is limited to a single or very limited number of tissues, and to use those polypeptides, and their encoding nucleic acids, to produce compositions of matter useful in the therapeutic treatment and diagnostic detection of cancer in mammals.

SUMMARY OF THE INVENTION

A.   Embodiments

In the present specification, Applicants describe for the first time the identification of various cellular polypeptides (and their encoding nucleic acids or fragments thereof) which are expressed to a greater degree on the surface of or by one or more types of cancer cell(s) as compared to on the surface of or by one or more types of normal non-cancer cells. Alternatively, such polypeptides are expressed by cells which produce and/or secrete polypeptides having a potentiating or growth-enhancing effect on cancer cells. Again alternatively, such polypeptides may not be overexpressed by tumor cells as compared to normal cells of the same tissue type, but rather may be specifically expressed by both tumor cells and normal cells of only a single or very limited

2

number of tissue types (preferably tissues which are not essential for life, e.g., prostate, etc.). All of the above polypeptides are herein referred to as Tumor-associated Antigenic Target polypeptides ("TAT" polypeptides) and are expected to serve as effective targets for cancer therapy and diagnosis in mammals.

5   Accordingly, in one embodiment of the present invention, the invention provides an isolated nucleic acid molecule having a nucleotide sequence that encodes a tumor-associated antigenic target polypeptide or fragment thereof (a "TAT" polypeptide).

       In certain aspects, the isolated nucleic acid molecule comprises a nucleotide sequence having at least about 80% nucleic acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or 100% nucleic acid sequence identity,

10   to (a) a DNA molecule encoding a full-length TAT polypeptide having an amino acid sequence as disclosed herein, a TAT polypeptide amino acid sequence lacking the signal peptide as disclosed herein, an extracellular domain of a transmembrane TAT polypeptide, with or without the signal peptide, as disclosed herein or any other specifically defined fragment of a full-length TAT polypeptide amino acid sequence as disclosed herein, or (b) the complement of the DNA molecule of (a).

15   In other aspects, the isolated nucleic acid molecule comprises a nucleotide sequence having at least about 80% nucleic acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or 100% nucleic acid sequence identity, to (a) a DNA molecule comprising the coding sequence of a full-length TAT polypeptide cDNA as disclosed herein, the coding sequence of a TAT polypeptide lacking the signal peptide as disclosed herein, the coding

20   sequence of an extracellular domain of a transmembrane TAT polypeptide, with or without the signal peptide, as disclosed herein or the coding sequence of any other specifically defined fragment of the full-length TAT polypeptide amino acid sequence as disclosed herein, or (b) the complement of the DNA molecule of (a).

       In further aspects, the invention concerns an isolated nucleic acid molecule comprising a nucleotide sequence having at least about 80% nucleic acid sequence identity, alternatively at least about 81%, 82%, 83%,

25   84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or 100% nucleic acid sequence identity, to (a) a DNA molecule that encodes the same mature polypeptide encoded by the full-length coding region of any of the human protein cDNAs deposited with the ATCC as disclosed herein, or (b) the complement of the DNA molecule of (a).

       Another aspect of the invention provides an isolated nucleic acid molecule comprising a nucleotide

30   sequence encoding a TAT polypeptide which is either transmembrane domain-deleted or transmembrane domain-inactivated, or is complementary to such encoding nucleotide sequence, wherein the transmembrane domain(s) of such polypeptide(s) are disclosed herein. Therefore, soluble extracellular domains of the herein described TAT polypeptides are contemplated.

       In other aspects, the present invention is directed to isolated nucleic acid molecules which hybridize

35   to (a) a nucleotide sequence encoding a TAT polypeptide having a full-length amino acid sequence as disclosed herein, a TAT polypeptide amino acid sequence lacking the signal peptide as disclosed herein, an extracellular

3

domain of a transmembrane TAT polypeptide, with or without the signal peptide, as disclosed herein or any other specifically defined fragment of a full-length TAT polypeptide amino acid sequence as disclosed herein, or (b) the complement of the nucleotide sequence of (a). In this regard, an embodiment of the present invention is directed to fragments of a full-length TAT polypeptide coding sequence, or the complement thereof, as disclosed herein, that may find use as, for example, hybridization probes useful as, for example, diagnostic probes, antisense oligonucleotide probes, or for encoding fragments of a full-length TAT polypeptide that may optionally encode a polypeptide comprising a binding site for an anti-TAT polypeptide antibody, a TAT binding oligopeptide or other small organic molecule that binds to a TAT polypeptide. Such nucleic acid fragments are usually at least about 5 nucleotides in length, alternatively at least about 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, or 1000 nucleotides in length, wherein in this context the term "about" means the referenced nucleotide sequence length plus or minus 10% of that referenced length. It is noted that novel fragments of a TAT polypeptide-encoding nucleotide sequence may be determined in a routine manner by aligning the TAT polypeptide-encoding nucleotide sequence with other known nucleotide sequences using any of a number of well known sequence alignment programs and determining which TAT polypeptide-encoding nucleotide sequence fragment(s) are novel. All of such novel fragments of TAT polypeptide-encoding nucleotide sequences are contemplated herein. Also contemplated are the TAT polypeptide fragments encoded by these nucleotide molecule fragments, preferably those TAT polypeptide fragments that comprise a binding site for an anti-TAT antibody, a TAT binding oligopeptide or other small organic molecule that binds to a TAT polypeptide.

In another embodiment, the invention provides isolated TAT polypeptides encoded by any of the isolated nucleic acid sequences hereinabove identified.

In a certain aspect, the invention concerns an isolated TAT polypeptide, comprising an amino acid sequence having at least about 80% amino acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or 100% amino acid sequence identity, to a TAT polypeptide having a full-length amino acid sequence as disclosed herein, a TAT polypeptide amino acid sequence lacking the signal peptide as disclosed herein, an extracellular domain of a transmembrane TAT polypeptide protein, with or without the signal peptide, as disclosed herein, an amino acid sequence encoded by any of the nucleic acid sequences disclosed herein or any other specifically defined fragment of a full-length TAT polypeptide amino acid sequence as disclosed herein.

In a further aspect, the invention concerns an isolated TAT polypeptide comprising an amino acid sequence having at least about 80% amino acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% amino acid

4

sequence identity, to an amino acid sequence encoded by any of the human protein cDNAs deposited with the ATCC as disclosed herein.

In a specific aspect, the invention provides an isolated TAT polypeptide without the N-terminal signal sequence and/or without the initiating methionine and is encoded by a nucleotide sequence that encodes such an amino acid sequence as hereinbefore described. Processes for producing the same are also herein described, wherein those processes comprise culturing a host cell comprising a vector which comprises the appropriate encoding nucleic acid molecule under conditions suitable for expression of the TAT polypeptide and recovering the TAT polypeptide from the cell culture.

Another aspect of the invention provides an isolated TAT polypeptide which is either transmembrane domain-deleted or transmembrane domain-inactivated. Processes for producing the same are also herein described, wherein those processes comprise culturing a host cell comprising a vector which comprises the appropriate encoding nucleic acid molecule under conditions suitable for expression of the TAT polypeptide and recovering the TAT polypeptide from the cell culture.

In other embodiments of the present invention, the invention provides vectors comprising DNA encoding any of the herein described polypeptides. Host cells comprising any such vector are also provided. By way of example, the host cells may be CHO cells, *E. coli* cells, or yeast cells. A process for producing any of the herein described polypeptides is further provided and comprises culturing host cells under conditions suitable for expression of the desired polypeptide and recovering the desired polypeptide from the cell culture.

In other embodiments, the invention provides isolated chimeric polypeptides comprising any of the herein described TAT polypeptides fused to a heterologous (non-TAT) polypeptide. Example of such chimeric molecules comprise any of the herein described TAT polypeptides fused to a heterologous polypeptide such as, for example, an epitope tag sequence or a Fc region of an immunoglobulin.

In another embodiment, the invention provides an antibody which binds, preferably specifically, to any of the above or below described polypeptides. Optionally, the antibody is a monoclonal antibody, antibody fragment, chimeric antibody, humanized antibody, single-chain antibody or antibody that competitively inhibits the binding of an anti-TAT polypeptide antibody to its respective antigenic epitope. Antibodies of the present invention may optionally be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The antibodies of the present invention may optionally be produced in CHO cells or bacterial cells and preferably induce death of a cell to which they bind. For diagnostic purposes, the antibodies of the present invention may be detectably labeled, attached to a solid support, or the like.

In other embodiments of the present invention, the invention provides vectors comprising DNA encoding any of the herein described antibodies. Host cell comprising any such vector are also provided. By way of example, the host cells may be CHO cells, *E. coli* cells, or yeast cells. A process for producing any of the herein described antibodies is further provided and comprises culturing host cells under conditions suitable for expression of the desired antibody and recovering the desired antibody from the cell culture.

In another embodiment, the invention provides oligopeptides ("TAT binding oligopeptides") which

bind, preferably specifically, to any of the above or below described TAT polypeptides. Optionally, the TAT binding oligopeptides of the present invention may be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The TAT binding oligopeptides of the present invention may optionally be produced in CHO cells or bacterial cells and preferably induce death of a cell to which they bind. For

5   diagnostic purposes, the TAT binding oligopeptides of the present invention may be detectably labeled, attached to a solid support, or the like.

In other embodiments of the present invention, the invention provides vectors comprising DNA encoding any of the herein described TAT binding oligopeptides. Host cell comprising any such vector are also provided. By way of example, the host cells may be CHO cells, *E. coli* cells, or yeast cells. A process for

10   producing any of the herein described TAT binding oligopeptides is further provided and comprises culturing host cells under conditions suitable for expression of the desired oligopeptide and recovering the desired oligopeptide from the cell culture.

In another embodiment, the invention provides small organic molecules ("TAT binding organic molecules") which bind, preferably specifically, to any of the above or below described TAT polypeptides.

15   Optionally, the TAT binding organic molecules of the present invention may be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The TAT binding organic molecules of the present invention preferably induce death of a cell to which they bind. For diagnostic purposes, the TAT binding organic molecules of the present invention may be detectably labeled, attached to a solid support, or

20   the like.

In a still further embodiment, the invention concerns a composition of matter comprising a TAT polypeptide as described herein, a chimeric TAT polypeptide as described herein, an anti-TAT antibody as described herein, a TAT binding oligopeptide as described herein, or a TAT binding organic molecule as described herein, in combination with a carrier. Optionally, the carrier is a pharmaceutically acceptable carrier.

25   In yet another embodiment, the invention concerns an article of manufacture comprising a container and a composition of matter contained within the container, wherein the composition of matter may comprise a TAT polypeptide as described herein, a chimeric TAT polypeptide as described herein, an anti-TAT antibody as described herein, a TAT binding oligopeptide as described herein, or a TAT binding organic molecule as described herein. The article may further optionally comprise a label affixed to the container, or a package

30   insert included with the container, that refers to the use of the composition of matter for the therapeutic treatment or diagnostic detection of a tumor.

Another embodiment of the present invention is directed to the use of a TAT polypeptide as described herein, a chimeric TAT polypeptide as described herein, an anti-TAT polypeptide antibody as described herein, a TAT binding oligopeptide as described herein, or a TAT binding organic molecule as described herein, for

35   the preparation of a medicament useful in the treatment of a condition which is responsive to the TAT polypeptide, chimeric TAT polypeptide, anti-TAT polypeptide antibody, TAT binding oligopeptide, or TAT

binding organic molecule.

B.   Additional Embodiments

Another embodiment of the present invention is directed to a method for inhibiting the growth of a cell that expresses a TAT polypeptide, wherein the method comprises contacting the cell with an antibody, an oligopeptide or a small organic molecule that binds to the TAT polypeptide, and wherein the binding of the antibody, oligopeptide or organic molecule to the TAT polypeptide causes inhibition of the growth of the cell expressing the TAT polypeptide. In preferred embodiments, the cell is a cancer cell and binding of the antibody, oligopeptide or organic molecule to the TAT polypeptide causes death of the cell expressing the TAT polypeptide. Optionally, the antibody is a monoclonal antibody, antibody fragment, chimeric antibody, humanized antibody, or single-chain antibody. Antibodies, TAT binding oligopeptides and TAT binding organic molecules employed in the methods of the present invention may optionally be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The antibodies and TAT binding oligopeptides employed in the methods of the present invention may optionally be produced in CHO cells or bacterial cells.

Yet another embodiment of the present invention is directed to a method of therapeutically treating a mammal having a cancerous tumor comprising cells that express a TAT polypeptide, wherein the method comprises administering to the mammal a therapeutically effective amount of an antibody, an oligopeptide or a small organic molecule that binds to the TAT polypeptide, thereby resulting in the effective therapeutic treatment of the tumor. Optionally, the antibody is a monoclonal antibody, antibody fragment, chimeric antibody, humanized antibody, or single-chain antibody. Antibodies, TAT binding oligopeptides and TAT binding organic molecules employed in the methods of the present invention may optionally be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The antibodies and oligopeptides employed in the methods of the present invention may optionally be produced in CHO cells or bacterial cells.

Yet another embodiment of the present invention is directed to a method of determining the presence of a TAT polypeptide in a sample suspected of containing the TAT polypeptide, wherein the method comprises exposing the sample to an antibody, oligopeptide or small organic molecule that binds to the TAT polypeptide and determining binding of the antibody, oligopeptide or organic molecule to the TAT polypeptide in the sample, wherein the presence of such binding is indicative of the presence of the TAT polypeptide in the sample. Optionally, the sample may contain cells (which may be cancer cells) suspected of expressing the TAT polypeptide. The antibody, TAT binding oligopeptide or TAT binding organic molecule employed in the method may optionally be detectably labeled, attached to a solid support, or the like.

A further embodiment of the present invention is directed to a method of diagnosing the presence of a tumor in a mammal, wherein the method comprises detecting the level of expression of a gene encoding a TAT polypeptide (a) in a test sample of tissue cells obtained from said mammal, and (b) in a control sample of known normal non-cancerous cells of the same tissue origin or type, wherein a higher level of expression of the

TAT polypeptide in the test sample, as compared to the control sample, is indicative of the presence of tumor in the mammal from which the test sample was obtained.

Another embodiment of the present invention is directed to a method of diagnosing the presence of a tumor in a mammal, wherein the method comprises (a) contacting a test sample comprising tissue cells obtained from the mammal with an antibody, oligopeptide or small organic molecule that binds to a TAT polypeptide and (b) detecting the formation of a complex between the antibody, oligopeptide or small organic molecule and the TAT polypeptide in the test sample, wherein the formation of a complex is indicative of the presence of a tumor in the mammal. Optionally, the antibody, TAT binding oligopeptide or TAT binding organic molecule employed is detectably labeled, attached to a solid support, or the like, and/or the test sample of tissue cells is obtained from an individual suspected of having a cancerous tumor.

Yet another embodiment of the present invention is directed to a method for treating or preventing a cell proliferative disorder associated with altered, preferably increased, expression or activity of a TAT polypeptide, the method comprising administering to a subject in need of such treatment an effective amount of an antagonist of a TAT polypeptide. Preferably, the cell proliferative disorder is cancer and the antagonist of the TAT polypeptide is an anti-TAT polypeptide antibody, TAT binding oligopeptide, TAT binding organic molecule or antisense oligonucleotide. Effective treatment or prevention of the cell proliferative disorder may be a result of direct killing or growth inhibition of cells that express a TAT polypeptide or by antagonizing the cell growth potentiating activity of a TAT polypeptide.

Yet another embodiment of the present invention is directed to a method of binding an antibody, oligopeptide or small organic molecule to a cell that expresses a TAT polypeptide, wherein the method comprises contacting a cell that expresses a TAT polypeptide with said antibody, oligopeptide or small organic molecule under conditions which are suitable for binding of the antibody, oligopeptide or small organic molecule to said TAT polypeptide and allowing binding therebetween.

Other embodiments of the present invention are directed to the use of (a) a TAT polypeptide, (b) a nucleic acid encoding a TAT polypeptide or a vector or host cell comprising that nucleic acid, (c) an anti-TAT polypeptide antibody, (d) a TAT-binding oligopeptide, or (e) a TAT-binding small organic molecule in the preparation of a medicament useful for (i) the therapeutic treatment or diagnostic detection of a cancer or tumor, or (ii) the therapeutic treatment or prevention of a cell proliferative disorder.

Another embodiment of the present invention is directed to a method for inhibiting the growth of a cancer cell, wherein the growth of said cancer cell is at least in part dependent upon the growth potentiating effect(s) of a TAT polypeptide (wherein the TAT polypeptide may be expressed either by the cancer cell itself or a cell that produces polypeptide(s) that have a growth potentiating effect on cancer cells), wherein the method comprises contacting the TAT polypeptide with an antibody, an oligopeptide or a small organic molecule that binds to the TAT polypeptide, thereby antagonizing the growth-potentiating activity of the TAT polypeptide and, in turn, inhibiting the growth of the cancer cell. Preferably the growth of the cancer cell is completely inhibited. Even more preferably, binding of the antibody, oligopeptide or small organic molecule to the TAT polypeptide induces the death of the cancer cell. Optionally, the antibody is a monoclonal antibody, antibody fragment,

8

chimeric antibody, humanized antibody, or single-chain antibody. Antibodies, TAT binding oligopeptides and TAT binding organic molecules employed in the methods of the present invention may optionally be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The antibodies and TAT binding oligopeptides employed in the methods of the present invention may optionally be produced in CHO cells or bacterial cells.

Yet another embodiment of the present invention is directed to a method of therapeutically treating a tumor in a mammal, wherein the growth of said tumor is at least in part dependent upon the growth potentiating effect(s) of a TAT polypeptide, wherein the method comprises administering to the mammal a therapeutically effective amount of an antibody, an oligopeptide or a small organic molecule that binds to the TAT polypeptide, thereby antagonizing the growth potentiating activity of said TAT polypeptide and resulting in the effective therapeutic treatment of the tumor. Optionally, the antibody is a monoclonal antibody, antibody fragment, chimeric antibody, humanized antibody, or single-chain antibody. Antibodies, TAT binding oligopeptides and TAT binding organic molecules employed in the methods of the present invention may optionally be conjugated to a growth inhibitory agent or cytotoxic agent such as a toxin, including, for example, a maytansinoid or calicheamicin, an antibiotic, a radioactive isotope, a nucleolytic enzyme, or the like. The antibodies and oligopeptides employed in the methods of the present invention may optionally be produced in CHO cells or bacterial cells.

Yet further embodiments of the present invention will be evident to the skilled artisan upon a reading of the present specification.

BRIEF DESCRIPTION OF THE DRAWINGS

In the list of figures for the present application, specific cDNA sequences which are upregulated in certain tumor tissues as compared to their normal tissue counterparts are individually identified with a designation beginning with the letters "DNA" followed by a specific numerical designation. A full or partial length protein sequence that is encoded by a cDNA sequence identified and shown herein is individually identified with a designation beginning with the letters "PRO" followed by a specific numerical designation. Figures showing encoded amino acid sequences immediately follow the figure showing the cDNA sequence encoding that specific amino acid sequence. If start and/or stop codons have been identified in a cDNA sequence shown in the attached figures, they are shown in bold and underlined font.

List of Figures

10

gen.XM_058240
Figure 103: DNA323775, XM_059117,
gen.XM_059117
Figure 104: PRO80527
Figure 105: DNA226262, NM_005563,
gen.NM_005563
Figure 106: PRO36725
Figure 107: DNA323776, NM_022778,
gen.NM_022778
Figure 108: PRO80528
Figure 109: DNA323777, XM_017846,
gen.XM_017846
Figure 110: DNA323778, NM_005517,
gen.NM_005517
Figure 111: PRO80530
Figure 112A-C: DNA323779, XM_046918,
gen.XM_046918
Figure 113: DNA323780, XM_002114,
gen.XM_002114
Figure 114: DNA323781, XM_059066,
gen.XM_059066
Figure 115: PRO80533
Figure 116: DNA323782, NM_018066,
gen.NM_018066
Figure 117: PRO80534
Figure 118: DNA323783, NM_006600,
gen.NM_006600
Figure 119: PRO80535
Figure 120: DNA323784, XM_059067,
gen.XM_059067
Figure 121: PRO80536
Figure 122: DNA323785, NM_032872,
gen.NM_032872
Figure 123: PRO80537
Figure 124: DNA196349, NM_006990,
gen.NM_006990
Figure 125: PRO24856
Figure 126: DNA323788, XM_001640,
gen.XM_001640
Figure 127: DNA323789, NM_002946,
gen.NM_002946
Figure 128: PRO59099
Figure 129: DNA323790, XM_114044,
gen.XM_114044
Figure 130: DNA323791, XM_059088,
gen.XM_059088
Figure 131: DNA323792, NM_031459,
gen.NM_031459
Figure 132: PRO80542
Figure 133: DNA323793, XM_010664,
gen.XM_010664
Figure 134: DNA323794, XM_001812,
gen.XM_001812
Figure 135: DNA323795, XM_001807,
gen.XM_001807
Figure 136: DNA323796, XM_086444,

gen.XM_086444
Figure 137: DNA323797, NM_024640,
gen.NM_024640
Figure 138: PRO80547
Figure 139A-B: DNA323798, XM_049310,
gen.XM_049310
Figure 140: DNA323799, XM_113374,
gen.XM_113374
Figure 141: DNA323800, XM_002105,
gen.XM_002105
Figure 142: DNA323801, NM_014571,
gen.NM_014571
Figure 143: PRO80550
Figure 144: DNA323802, XM_165438,
gen.XM_165438
Figure 145: DNA323803, XM_029844,
gen.XM_029844
Figure 146: DNA188748, NM_006559,
gen.NM_006559
Figure 147: PRO22304
Figure 148: DNA323804, NM_003757,
gen.NM_003757
Figure 149: PRO80553
Figure 150: DNA323805, NM_004964,
gen.NM_004964
Figure 151: PRO80554
Figure 152: DNA323806, NM_023009,
gen.NM_023009
Figure 153: PRO80555
Figure 154: DNA323807, XM_030423,
gen.XM_030423
Figure 155A-B: DNA323808, XM_036299,
gen.XM_036299
Figure 156: PRO80557
Figure 157: DNA227213, NM_003680,
gen.NM_003680
Figure 158: PRO37676
Figure 159: DNA323809, NM_006112,
gen.NM_006112
Figure 160: PRO80558
Figure 161: DNA323810, XM_018136,
gen.XM_018136
Figure 162: PRO80559
Figure 163: DNA323811, XM_117184,
gen.XM_117184
Figure 164: PRO80560
Figure 165: DNA323812, NM_017825,
gen.NM_017825
Figure 166: PRO80561
Figure 167: DNA189315, NM_014408,
gen.NM_014408
Figure 168: PRO22262
Figure 169A-B: DNA323813, XM_029031,
gen.XM_029031
Figure 170: PRO80562
Figure 171: DNA323814, XM_059171,

13

Figure 525: DNA323990, XM_114109, gen.XM_114109
Figure 526: PRO80714
Figure 527: DNA323991, NM_022371, gen.NM_022371
Figure 528: PRO80715
Figure 529: DNA323992, NM_004673, gen.NM_004673
Figure 530: PRO188
Figure 531: DNA323993, XM_060517, gen.XM_060517
Figure 532: DNA323994, XM_165978, gen.XM_165978
Figure 533: PRO80717
Figure 534: DNA323995, XM_117181, gen.XM_117181
Figure 535: DNA323996, NM_018122, gen.NM_018122
Figure 536: PRO80719
Figure 537: DNA323997, XM_042967, gen.XM_042967
Figure 538: DNA323998, XM_086494, gen.XM_086494
Figure 539: PRO80720
Figure 540: DNA290234, NM_002923, gen.NM_002923
Figure 541: PRO70333
Figure 542: DNA323999, XM_086328, gen.XM_086328
Figure 543: DNA324000, XM_086282, gen.XM_086282
Figure 544: DNA324001, XM_053633, gen.XM_053633
Figure 545: DNA256905, NM_138391, gen.NM_138391
Figure 546: PRO51836
Figure 547: DNA324002, XM_015434, gen.XM_015434
Figure 548: DNA324003, NM_006763, gen.NM_006763
Figure 549: PRO80725
Figure 550: DNA227246, NM_005686, gen.NM_005686
Figure 551: PRO37709
Figure 552: DNA324004, XM_058405, gen.XM_058405
Figure 553A-B: DNA226005, NM_000228, gen.NM_000228
Figure 554: PRO36468
Figure 555: DNA324005, NM_015714, gen.NM_015714
Figure 556: PRO11582
Figure 557: DNA324006, XM_086142, gen.XM_086142
Figure 558: DNA83046, NM_000574, gen.NM_000574
Figure 559: PRO2569

Figure 560A-B: DNA324007, XM_114030, gen.XM_114030
Figure 561: DNA324008, XM_097519, gen.XM_097519
Figure 562: DNA324009, XM_059120, gen.XM_059120
Figure 563: PRO80730
Figure 564: DNA324010, NM_016456, gen.NM_016456
Figure 565: PRO1248
Figure 566: DNA324011, XM_036556, gen.XM_036556
Figure 567: DNA324012, XM_001914, gen.XM_001914
Figure 568: DNA324013, XM_001916, gen.XM_001916
Figure 569: DNA324014, NM_018085, gen.NM_018085
Figure 570: PRO80734
Figure 571: DNA324015, NM_006335, gen.NM_006335
Figure 572: PRO80735
Figure 573: DNA324016, XM_036500, gen.XM_036500
Figure 574: PRO80736
Figure 575: DNA324017, XM_036507, gen.XM_036507
Figure 576: DNA196344, NM_004767, gen.NM_004767
Figure 577: PRO24851
Figure 578: DNA247474, NM_014176, gen.NM_014176
Figure 579: PRO44999
Figure 580A-B: DNA324018, XM_084055, gen.XM_084055
Figure 581: DNA324019, XM_010682, gen.XM_010682
Figure 582: DNA324020, XM_117185, gen.XM_117185
Figure 583: DNA324021, XM_055880, gen.XM_055880
Figure 584: PRO80740
Figure 585: DNA193882, NM_014184, gen.NM_014184
Figure 586: PRO23300
Figure 587: DNA324022, NM_018212, gen.NM_018212
Figure 588: PRO80741
Figure 589: DNA324023, XM_086431, gen.XM_086431
Figure 590: PRO80742
Figure 591: DNA324024, XM_037329, gen.XM_037329
Figure 592: DNA324025, XM_086432, gen.XM_086432
Figure 593A-B: DNA324026, XM_010732,

17

gen.XM_010732
Figure 594: DNA227504, NM_000447,
gen.NM_000447
Figure 595: PRO37967
Figure 596: DNA324027, NM_012486,
gen.NM_012486
Figure 597: PRO80745
Figure 598A-B: DNA324028, XM_113361,
gen.XM_113361
Figure 599A-B: DNA324029, XM_001958,
gen.XM_001958
Figure 600: DNA324030, XM_016199,
gen.XM_016199
Figure 601: DNA324031, XM_086244,
gen.XM_086244
Figure 602: DNA324032, XM_086245,
gen.XM_086245
Figure 603: DNA254346, NM_024709,
gen.NM_024709
Figure 604: PRO49457
Figure 605: DNA324033, XM_088107,
gen.XM_088107
Figure 606: DNA324034, NM_032890,
gen.NM_032890
Figure 607: PRO80752
Figure 608: DNA324035, XM_052974,
gen.XM_052974
Figure 609: PRO80753
Figure 610: DNA324036, XM_047499,
gen.XM_047499
Figure 611: PRO80754
Figure 612: DNA324037, NM_000858,
gen.NM_000858
Figure 613: PRO80755
Figure 614: DNA324038, NM_024319,
gen.NM_024319
Figure 615: PRO80756
Figure 616: DNA324039, XM_047545,
gen.XM_047545
Figure 617: PRO4914
Figure 618A-B: DNA324040, XM_056884,
gen.XM_056884
Figure 619: DNA324041, XM_098599,
gen.XM_098599
Figure 620: DNA324042, XM_165439,
gen.XM_165439
Figure 621: PRO80759
Figure 622: DNA324043, XM_089030,
gen.XM_089030
Figure 623: PRO80760
Figure 624: DNA82328, NM_000029, gen.NM_000029
Figure 625: PRO1707
Figure 626: DNA324044, NM_014236,
gen.NM_014236
Figure 627: PRO80761
Figure 628: DNA324045, XM_056970,

gen.XM_056970
Figure 629: PRO80762
Figure 630: DNA324046, NM_032324,
gen.NM_032324
Figure 631: PRO80763
Figure 632: DNA324047, XM_086257,
gen.XM_086257
Figure 633: PRO80764
Figure 634: DNA324048, XM_114137,
gen.XM_114137
Figure 635: PRO80765
Figure 636: DNA324049, NM_000143,
gen.NM_000143
Figure 637: PRO62607
Figure 638: DNA324050, XM_090833,
gen.XM_090833
Figure 639: DNA324051, NM_130398,
gen.NM_130398
Figure 640: PRO80767
Figure 641: DNA324052, XM_117196,
gen.XM_117196
Figure 642: DNA324053, XM_018041,
gen.XM_018041
Figure 643: DNA324054, NM_001011,
gen.NM_001011
Figure 644: PRO10692
Figure 645: DNA324055, NM_024027,
gen.NM_024027
Figure 646: PRO1182
Figure 647: DNA324056, NM_016030,
gen.NM_016030
Figure 648: PRO80770
Figure 649: DNA103217, NM_003310,
gen.NM_003310
Figure 650: PRO4547
Figure 651: DNA275195, NM_001034,
gen.NM_001034
Figure 652: PRO62893
Figure 653: DNA324057, XM_059368,
gen.XM_059368
Figure 654: PRO80771
Figure 655: DNA324058, NM_006826,
gen.NM_006826
Figure 656: PRO70258
Figure 657: DNA324059, NM_005378,
gen.NM_005378
Figure 658: PRO80772
Figure 659: DNA324060, NM_002539,
gen.NM_002539
Figure 660: PRO80773
Figure 661: DNA324061, XM_096149,
gen.XM_096149
Figure 662: DNA275049, NM_004939,
gen.NM_004939
Figure 663: PRO62770
Figure 664A-B: DNA324062, XM_036450,

gen.XM_036450
Figure 665: DNA324063, XM_103946, gen.XM_103946
Figure 666: PRO80775
Figure 667: DNA324064, NM_014713, gen.NM_014713
Figure 668: PRO80776
Figure 669: DNA324065, XM_087206, gen.XM_087206
Figure 670: DNA324066, NM_106552, gen.NM_106552
Figure 671: PRO80778
Figure 672: DNA324067, XM_092135, gen.XM_092135
Figure 673: PRO80779
Figure 674: DNA324068, NM_017910, gen.NM_017910
Figure 675: PRO80780
Figure 676: DNA324069, XM_092517, gen.XM_092517
Figure 677: PRO80781
Figure 678A-B: DNA324070, NM_025203, gen.NM_025203
Figure 679: PRO80782
Figure 680: DNA324071, XM_002480, gen.XM_002480
Figure 681: DNA324072, NM_002707, gen.NM_002707
Figure 682: PRO12199
Figure 683: DNA324073, XM_087151, gen.XM_087151
Figure 684: DNA227165, NM_014748, gen.NM_014748
Figure 685: PRO37628
Figure 686: DNA324074, NM_015636, gen.NM_015636
Figure 687: PRO80785
Figure 688: DNA273800, NM_001521, gen.NM_001521
Figure 689: PRO61761
Figure 690: DNA324075, XM_047175, gen.XM_047175
Figure 691: PRO80786
Figure 692A-B: DNA324076, NM_004341, gen.NM_004341
Figure 693: PRO80787
Figure 694: DNA324077, NM_016085, gen.NM_016085
Figure 695: PRO80788
Figure 696: DNA324078, NM_080592, gen.NM_080592
Figure 697: PRO80789
Figure 698: DNA227545, NM_021095, gen.NM_021095
Figure 699: PRO38008
Figure 700: DNA324079, XM_002435,

gen.XM_002435
Figure 701: DNA324080, NM_000221, gen.NM_000221
Figure 702: PRO80790
Figure 703: DNA271243, NM_006488, gen.NM_006488
Figure 704: PRO59558
Figure 705: DNA324081, NM_007046, gen.NM_007046
Figure 706: PRO9886
Figure 707: DNA324082, NM_021831, gen.NM_021831
Figure 708: PRO80791
Figure 709: DNA324083, NM_020134, gen.NM_020134
Figure 710: PRO80792
Figure 711: DNA103593, NM_000183, gen.NM_000183
Figure 712: PRO4917
Figure 713: DNA324084, NM_000182, gen.NM_000182
Figure 714: PRO80793
Figure 715: DNA324085, XM_097976, gen.XM_097976
Figure 716A-B: DNA324086, XM_039712, gen.XM_039712
Figure 717: DNA324087, NM_022552, gen.NM_022552
Figure 718: PRO80796
Figure 719: DNA324088, NM_024572, gen.NM_024572
Figure 720: PRO80797
Figure 721: DNA324089, NM_018607, gen.NM_018607
Figure 722: PRO80798
Figure 723: DNA324090, XM_165448, gen.XM_165448
Figure 724: PRO80799
Figure 725: DNA324091, XM_087195, gen.XM_087195
Figure 726: DNA324092, XM_087193, gen.XM_087193
Figure 727: DNA324093, NM_138801, gen.NM_138801
Figure 728: PRO80802
Figure 729: DNA324094, XM_098004, gen.XM_098004
Figure 730: PRO80803
Figure 731: DNA324095, XM_031519, gen.XM_031519
Figure 732: PRO80804
Figure 733A-B: DNA324096, XM_031527, gen.XM_031527
Figure 734: DNA324097, XM_038576, gen.XM_038576
Figure 735: PRO80806

19

Figure 736: DNA324098, XM_117264, gen.XM_117264
Figure 737: PRO80807
Figure 738A-B: DNA324099, XM_031626, gen.XM_031626
Figure 739: PRO80808
Figure 740: DNA324100, XM_057664, gen.XM_057664
Figure 741: DNA226428, NM_000251, gen.NM_000251
Figure 742: PRO36891
Figure 743: DNA324101, XM_087211, gen.XM_087211
Figure 744A-B: DNA275066, NM_000179, gen.NM_000179
Figure 745: PRO62786
Figure 746A-C: DNA270154, NM_003128, gen.NM_003128
Figure 747: PRO58543
Figure 748: DNA324102, XM_087051, gen.XM_087051
Figure 749: DNA324103, NM_002954, gen.NM_002954
Figure 750: PRO62239
Figure 751: DNA271060, NM_002453, gen.NM_002453
Figure 752: PRO59384
Figure 753: DNA324104, XM_048088, gen.XM_048088
Figure 754: PRO80811
Figure 755: DNA324105, XM_010886, gen.XM_010886
Figure 756: PRO80812
Figure 757: DNA324106, XM_045283, gen.XM_045283
Figure 758: PRO80813
Figure 759: DNA324107, NM_006430, gen.NM_006430
Figure 760: PRO80814
Figure 761A-B: DNA324108, NM_003400, gen.NM_003400
Figure 762: PRO59544
Figure 763: DNA324109, XM_018301, gen.XM_018301
Figure 764: DNA324110, NM_005917, gen.NM_005917
Figure 765: PRO4918
Figure 766: DNA324111, XM_016843, gen.XM_016843
Figure 767: PRO80816
Figure 768: DNA324112, XM_088638, gen.XM_088638
Figure 769: PRO80817
Figure 770: DNA324113, XM_002647, gen.XM_002647
Figure 771: DNA324114, XM_010881,

gen.XM_010881
Figure 772: DNA324115, XM_087069, gen.XM_087069
Figure 773: DNA324116, XM_016625, gen.XM_016625
Figure 774: PRO80820
Figure 775: DNA324117, XM_087068, gen.XM_087068
Figure 776: DNA324118, XM_002674, gen.XM_002674
Figure 777: DNA324119, XM_065884, gen.XM_065884
Figure 778: PRO80823
Figure 779A-B: DNA324120, XM_002739, gen.XM_002739
Figure 780: DNA324121, XM_031596, gen.XM_031596
Figure 781: PRO61325
Figure 782: DNA324122, XM_031585, gen.XM_031585
Figure 783: DNA324123, XM_031586, gen.XM_031586
Figure 784: DNA324124, XM_018039, gen.XM_018039
Figure 785: DNA324125, NM_032822, gen.NM_032822
Figure 786: PRO80827
Figure 787A-B: DNA324126, XM_096172, gen.XM_096172
Figure 788A-B: DNA324127, XM_002727, gen.XM_002727
Figure 789: DNA324128, NM_003124, gen.NM_003124
Figure 790: PRO80830
Figure 791: DNA324129, XM_086980, gen.XM_086980
Figure 792: DNA227795, NM_006429, gen.NM_006429
Figure 793: PRO38258
Figure 794: DNA287167, NM_006636, gen.NM_006636
Figure 795: PRO59136
Figure 796: DNA324130, NM_033046, gen.NM_033046
Figure 797: PRO80832
Figure 798: DNA324131, NM_133637, gen.NM_133637
Figure 799: PRO80833
Figure 800: DNA324132, XM_035220, gen.XM_035220
Figure 801: DNA324133, NM_013247, gen.NM_013247
Figure 802: PRO80835
Figure 803: DNA227528, NM_021103, gen.NM_021103
Figure 804: PRO37991

20

Figure 805: DNA324134, XM_086920, gen.XM_086920
Figure 806: DNA150725, NM_001747, gen.NM_001747
Figure 807: PRO12792
Figure 808: DNA324135, NM_005911, gen.NM_005911
Figure 809: PRO80837
Figure 810: DNA324136, NM_032827, gen.NM_032827
Figure 811: PRO80838
Figure 812: DNA324137, NM_017952, gen.NM_017952
Figure 813: PRO80839
Figure 814: DNA227190, NM_006839, gen.NM_006839
Figure 815: PRO37653
Figure 816: DNA324138, XM_114215, gen.XM_114215
Figure 817: DNA324139, XM_052989, gen.XM_052989
Figure 818: DNA324140, XM_049116, gen.XM_049116
Figure 819: PRO80842
Figure 820A-B: DNA324141, XM_049108, gen.XM_049108
Figure 821: PRO80843
Figure 822: DNA324142, XM_049113, gen.XM_049113
Figure 823: DNA324143, XM_002611, gen.XM_002611
Figure 824A-B: DNA324144, XM_114247, gen.XM_114247
Figure 825: DNA324145, NM_017789, gen.NM_017789
Figure 826: PRO80846
Figure 827: DNA324146, NM_001862, gen.NM_001862
Figure 828: PRO80847
Figure 829: DNA324147, NM_005783, gen.NM_005783
Figure 830: PRO80848
Figure 831A-B: DNA324148, XM_037108, gen.XM_037108
Figure 832: DNA324149, NM_000993, gen.NM_000993
Figure 833: PRO11197
Figure 834: DNA324150, NM_017546, gen.NM_017546
Figure 835: PRO80850
Figure 836: DNA324151, NM_001450, gen.NM_001450
Figure 837: PRO80851
Figure 838: DNA324152, XM_114229, gen.XM_114229
Figure 839: DNA324153, XM_087122,

gen.XM_087122
Figure 840: PRO80853
Figure 841: DNA324154, XM_018540, gen.XM_018540
Figure 842: DNA324155, XM_087040, gen.XM_087040
Figure 843: DNA324156, NM_032212, gen.NM_032212
Figure 844: PRO80856
Figure 845: DNA324157, XM_002217, gen.XM_002217
Figure 846: PRO80857
Figure 847: DNA324158, NM_000576, gen.NM_000576
Figure 848: PRO65
Figure 849: DNA324159, XM_086923, gen.XM_086923
Figure 850: DNA324160, XM_086925, gen.XM_086925
Figure 851A-B: DNA324161, XM_114266, gen.XM_114266
Figure 852: PRO80860
Figure 853: DNA324162, XM_002704, gen.XM_002704
Figure 854: DNA194740, NM_005291, gen.NM_005291
Figure 855: PRO24028
Figure 856A-B: DNA324163, XM_114267, gen.XM_114267
Figure 857: DNA324164, XM_034952, gen.XM_034952
Figure 858: DNA324165, XM_086950, gen.XM_086950
Figure 859A-B: DNA255531, NM_017751, gen.NM_017751
Figure 860: PRO50596
Figure 861: DNA324166, XM_017698, gen.XM_017698 .
Figure 862: DNA324167, XM_030529, gen.XM_030529
Figure 863: PRO80866
Figure 864: DNA275240, NM_005915, gen.NM_005915
Figure 865: PRO62927
Figure 866: DNA324168, XM_043173, gen.XM_043173
Figure 867: DNA324169, XM_092489, gen.XM_092489
Figure 868: PRO80868
Figure 869: DNA324170, XM_115672, gen.XM_115672
Figure 870: PRO80869
Figure 871: DNA324171, NM_020548, gen.NM_020548
Figure 872: PRO60753
Figure 873: DNA324172, XM_037101,

gen.XM_037101
Figure 874: PRO80870
Figure 875: DNA324173, NM_032390,
gen.NM_032390
Figure 876: PRO80871
Figure 877: DNA324174, XM_002447,
gen.XM_002447
Figure 878: DNA324175, NM_033416,
gen.NM_033416
Figure 879: PRO80873
Figure 880: DNA324176, XM_016288,
gen.XM_016288
Figure 881: DNA272127, NM_003937,
gen.NM_003937
Figure 882: PRO60397
Figure 883: DNA324177, XM_030582,
gen.XM_030582
Figure 884: PRO80875
Figure 885: DNA324178, NM_015702,
gen.NM_015702
Figure 886: PRO80876
Figure 887: DNA324179, NM_016838,
gen.NM_016838
Figure 888: PRO80877
Figure 889: DNA324180, NM_016839,
gen.NM_016839
Figure 890: PRO80878
Figure 891: DNA324181, XM_087118,
gen.XM_087118
Figure 892: PRO80879
Figure 893: DNA324182, XM_165998,
gen.XM_165998
Figure 894: DNA324183, NM_001935,
gen.NM_001935
Figure 895: PRO80881
Figure 896: DNA324184, NM_020675,
gen.NM_020675
Figure 897: PRO80882
Figure 898: DNA88051, NM_000079, gen.NM_000079
Figure 899: PRO2146
Figure 900: DNA324185, XM_166008,
gen.XM_166008
Figure 901: DNA324186, XM_087240,
gen.XM_087240
Figure 902: PRO11403
Figure 903: DNA324187, NM_013341,
gen.NM_013341
Figure 904: PRO80883
Figure 905: DNA304805, NM_031942,
gen.NM_031942
Figure 906: PRO69531
Figure 907: DNA324188, XM_059465,
gen.XM_059465
Figure 908: PRO80884
Figure 909: DNA324189, XM_015920,
gen.XM_015920

Figure 910: DNA324190, XM_166007,
gen.XM_166007
Figure 911: DNA324191, XM_015922,
gen.XM_015922
Figure 912: DNA324192, XM_087061,
gen.XM_087061
Figure 913: PRO80888
Figure 914: DNA324193, XM_087062,
gen.XM_087062
Figure 915: PRO80889
Figure 916: DNA324194, NM_001463,
gen.NM_001463
Figure 917: PRO80890
Figure 918: DNA324195, XM_092158,
gen.XM_092158
Figure 919: PRO80891
Figure 920: DNA324196, XM_059351,
gen.XM_059351
Figure 921A-B: DNA324197, NM_000090,
gen.NM_000090
Figure 922: PRO2665
Figure 923: DNA324198, NM_014585,
gen.NM_014585
Figure 924: PRO37675
Figure 925: DNA324199, XM_010778,
gen.XM_010778
Figure 926: DNA324200, XM_086961,
gen.XM_086961
Figure 927: DNA324201, XM_165994,
gen.XM_165994
Figure 928: DNA324202, XM_045170,
gen.XM_045170
Figure 929: DNA324203, XM_113390,
gen.XM_113390
Figure 930: DNA299899, NM_002157,
gen.NM_002157
Figure 931: PRO62760
Figure 932: DNA324204, XM_087045,
gen.XM_087045
Figure 933: DNA324205, XM_086944,
gen.XM_086944
Figure 934: DNA271608, NM_014670,
gen.NM_014670
Figure 935: PRO59895
Figure 936: DNA324206, XM_027963,
gen.XM_027963
Figure 937: PRO80900
Figure 938: DNA324207, XM_010852,
gen.XM_010852
Figure 939: PRO80901
Figure 940: DNA324208, XM_028034,
gen.XM_028034
Figure 941: DNA324209, NM_015934,
gen.NM_015934
Figure 942: DNA324210, XM_087028,
gen.XM_087028

22

24

27

gen.XM_039796
Figure 1293: PRO81064
Figure 1294: DNA324400, XM_016334, gen.XM_016334
Figure 1295: DNA324401, XM_116058, gen.XM_116058
Figure 1296: DNA324402, XM_113408, gen.XM_113408
Figure 1297: DNA324403, NM_002492, gen.NM_002492
Figure 1298: PRO81068
Figure 1299: DNA324404, XM_037381, gen.XM_037381
Figure 1300: DNA324405, XM_037377, gen.XM_037377
Figure 1301: PRO69681
Figure 1302A-B: DNA324406, XM_087254, gen.XM_087254
Figure 1303: PRO81070
Figure 1304: DNA324407, XM_037600, gen.XM_037600
Figure 1305: PRO81071
Figure 1306: DNA324408, NM_018023, gen.NM_018023
Figure 1307: PRO81072
Figure 1308: DNA324409, XM_093423, gen.XM_093423
Figure 1309: PRO81073
Figure 1310: DNA324410, XM_029136, gen.XM_029136
Figure 1311: PRO81074
Figure 1312: DNA324411, XM_087322, gen.XM_087322
Figure 1313A-B: DNA324412, XM_029132, gen.XM_029132
Figure 1314A-B: DNA324413, XM_029104, gen.XM_029104
Figure 1315: DNA324414, XM_084120, gen.XM_084120
Figure 1316: DNA254620, NM_005787, gen.NM_005787
Figure 1317: PRO49722
Figure 1318: DNA324415, NM_032331, gen.NM_032331
Figure 1319: PRO81079
Figure 1320: DNA324416, XM_011074, gen.XM_011074
Figure 1321: PRO81080
Figure 1322: DNA324417, XM_087295, gen.XM_087295
Figure 1323: DNA324418, XM_087289, gen.XM_087289
Figure 1324: PRO81082
Figure 1325: DNA324419, XM_105658, gen.XM_105658
Figure 1326: PRO81083

Figure 1327: DNA89239, NM_000893, gen.NM_000893
Figure 1328: PRO2906
Figure 1329: DNA324420, XM_113422, gen.XM_113422
Figure 1330: DNA225592, NM_001622, gen.NM_001622
Figure 1331: PRO36055
Figure 1332: DNA324421, XM_005180, gen.XM_005180
Figure 1333: DNA324422, XM_087392, gen.XM_087392
Figure 1334: PRO81086
Figure 1335A-B: DNA272605, NM_003722, gen.NM_003722
Figure 1336: PRO60741
Figure 1337: DNA324423, XM_117311, gen.XM_117311
Figure 1338: DNA324424, XM_116034, gen.XM_116034
Figure 1339: PRO81088
Figure 1340A-B: DNA324425, XM_084110, gen.XM_084110
Figure 1341: DNA324426, XM_038243, gen.XM_038243
Figure 1342: PRO81090
Figure 1343: DNA324427, XM_087359, gen.XM_087359
Figure 1344: DNA324428, XM_114328, gen.XM_114328
Figure 1345: DNA324429, XM_098109, gen.XM_098109
Figure 1346: PRO81093
Figure 1347: DNA324430, XM_087410, gen.XM_087410
Figure 1348: DNA324431, NM_033316, gen.NM_033316
Figure 1349: PRO81095
Figure 1350: DNA324432, XM_166017, gen.XM_166017
Figure 1351: PRO81096
Figure 1352: DNA79129, NM_001647, gen.NM_001647
Figure 1353: PRO2551
Figure 1354: DNA324433, NM_032288, gen.NM_032288
Figure 1355: PRO81097
Figure 1356: DNA324434, XM_086228, gen.XM_086228
Figure 1357: PRO81098
Figure 1358: DNA324435, XM_087278, gen.XM_087278
Figure 1359: DNA324436, XM_018523, gen.XM_018523
Figure 1360: DNA324437, XM_087297, gen.XM_087297

Figure 1361: DNA324438, XM_002255, gen.XM_002255
Figure 1362: PRO81102
Figure 1363: DNA324439, XM_053122, gen.XM_053122
Figure 1364: DNA324440, XM_042695, gen.XM_042695
Figure 1365: DNA324441, XM_011160, gen.XM_011160
Figure 1366: DNA324442, NM_007100, gen.NM_007100
Figure 1367: PRO81106
Figure 1368: DNA139747, NM_002477, gen.NM_002477
Figure 1369: PRO9785
Figure 1370: DNA253804, NM_032219, gen.NM_032219
Figure 1371: PRO49209
Figure 1372: DNA324443, NM_138385, gen.NM_138385
Figure 1373: PRO81107
Figure 1374: DNA324444, NM_006342, gen.NM_006342
Figure 1375: PRO81108
Figure 1376A-C: DNA324445, NM_133330, gen.NM_133330
Figure 1377: PRO81109
Figure 1378A-C: DNA324446, NM_014919, gen.NM_014919
Figure 1379: PRO81110
Figure 1380A-C: DNA324447, NM_133332, gen.NM_133332
Figure 1381: PRO81111
Figure 1382: DNA324448, NM_005663, gen.NM_005663
Figure 1383: PRO81112
Figure 1384A-B: DNA324449, XM_098248, gen.XM_098248
Figure 1385: PRO81113
Figure 1386: DNA270615, NM_002938, gen.NM_002938
Figure 1387: PRO58986
Figure 1388A-B: DNA324450, NM_014190, gen.NM_014190
Figure 1389: PRO81114
Figure 1390A-B: DNA324451, NM_014189, gen.NM_014189
Figure 1391: PRO81115
Figure 1392: DNA324452, XM_035572, gen.XM_035572
Figure 1393: PRO81116
Figure 1394A-B: DNA324453, NM_014556, gen.NM_014556
Figure 1395: PRO81117
Figure 1396: DNA324454, NM_001313, gen.NM_001313

Figure 1397: PRO60542
Figure 1398A-B: DNA324455, XM_052626, gen.XM_052626
Figure 1399: PRO81118
Figure 1400: DNA324456, NM_016930, gen.NM_016930
Figure 1401: PRO81119
Figure 1402: DNA324457, XM_035824, gen.XM_035824
Figure 1403: PRO81120
Figure 1404: DNA324458, NM_033296, gen.NM_033296
Figure 1405: PRO81121
Figure 1406: DNA324459, NM_138699, gen.NM_138699
Figure 1407: PRO81122
Figure 1408: DNA324460, XM_116285, gen.XM_116285
Figure 1409: PRO81123
Figure 1410: DNA324461, XM_041221, gen.XM_041221
Figure 1411: PRO81124
Figure 1412: DNA324462, XM_117351, gen.XM_117351
Figure 1413: DNA324463, XM_039165, gen.XM_039165
Figure 1414: DNA324464, NM_025205, gen.NM_025205
Figure 1415: PRO81127
Figure 1416: DNA324465, XM_039173, gen.XM_039173
Figure 1417: DNA324466, XM_039176, gen.XM_039176
Figure 1418: DNA324467, XM_087583, gen.XM_087583
Figure 1419: DNA324468, NM_017491, gen.NM_017491
Figure 1420: PRO12077
Figure 1421: DNA324469, NM_005112, gen.NM_005112
Figure 1422: PRO81131
Figure 1423: DNA324470, XM_011129, gen.XM_011129
Figure 1424A-B: DNA324471, XM_052530, gen.XM_052530
Figure 1425: DNA324472, NM_000661, gen.NM_000661
Figure 1426: PRO81134
Figure 1427A-B: DNA324473, NM_002913, gen.NM_002913
Figure 1428: PRO81135
Figure 1429A-B: DNA324474, XM_047477, gen.XM_047477
Figure 1430: DNA324475, NM_004181, gen.NM_004181
Figure 1431: PRO81137

Figure 1432: DNA324476, XM_003435,
gen.XM_003435
Figure 1433: DNA324478, XM_010941,
gen.XM_010941
Figure 1434: DNA324479, XM_059593,
gen.XM_059593
Figure 1435: DNA324480, NM_001553,
gen.NM_001553
Figure 1436: PRO81141
Figure 1437: DNA257511, NM_032313,
gen.NM_032313
Figure 1438: PRO52083
Figure 1439: DNA324481, XM_071623,
gen.XM_071623
Figure 1440A-B: DNA324482, XM_036002,
gen.XM_036002
Figure 1441: DNA324483, XM_058927,
gen.XM_058927
Figure 1442: DNA324484, XM_059628,
gen.XM_059628
Figure 1443: DNA324485, XM_046057,
gen.XM_046057
Figure 1444: PRO81146
Figure 1445: DNA324486, XM_031320,
gen.XM_031320
Figure 1446: DNA225919, NM_001134,
gen.NM_001134
Figure 1447: PRO36382
Figure 1448A-B: DNA324487, XM_003511,
gen.XM_003511
Figure 1449: DNA324488, NM_006835,
gen.NM_006835
Figure 1450: PRO4605
Figure 1451: DNA324489, XM_003305,
gen.XM_003305
Figure 1452: DNA324490, XM_113425,
gen.XM_113425
Figure 1453: DNA324491, XM_001389,
gen.XM_001389
Figure 1454: PRO81148
Figure 1455: DNA324492, XM_087527,
gen.XM_087527
Figure 1456: DNA324493, XM_035986,
gen.XM_035986
Figure 1457A-B: DNA324494, NM_014933,
gen.NM_014933
Figure 1458: PRO81150
Figure 1459: DNA290585, NM_000582,
gen.NM_000582
Figure 1460: PRO70536
Figure 1461: DNA324495, XM_055551,
gen.XM_055551
Figure 1462: PRO81151
Figure 1463: DNA324496, XM_087498,
gen.XM_087498
Figure 1464: DNA324497, XM_096203,

gen.XM_096203
Figure 1465: DNA324498, XM_084158,
gen.XM_084158
Figure 1466: DNA324499, XM_034710,
gen.XM_034710
Figure 1467: PRO81156
Figure 1468: DNA324500, XM_034713,
gen.XM_034713
Figure 1469: DNA324501, XM_059633,
gen.XM_059633
Figure 1470: DNA324502, XM_114426,
gen.XM_114426
Figure 1471: DNA324503, XM_056957,
gen.XM_056957
Figure 1472: DNA324504, XM_088472,
gen.XM_088472
Figure 1473: DNA324505, XM_114424,
gen.XM_114424
Figure 1474A-B: DNA324506, XM_042301,
gen.XM_042301
Figure 1475: PRO81163
Figure 1476: DNA324507, XM_017925,
gen.XM_017925
Figure 1477: DNA324508, XM_052336,
gen.XM_052336
Figure 1478: DNA324509, NM_002106,
gen.NM_002106
Figure 1479: PRO10297
Figure 1480: DNA324510, XM_085068,
gen.XM_085068
Figure 1481: PRO81166
Figure 1482: DNA324511, XM_165473,
gen.XM_165473
Figure 1483: DNA324512, XM_087514,
gen.XM_087514
Figure 1484: DNA324513, XM_116247,
gen.XM_116247
Figure 1485: DNA324514, NM_002358,
gen.NM_002358
Figure 1486: PRO81169
Figure 1487: DNA324515, XM_050200,
gen.XM_050200
Figure 1488: PRO81170
Figure 1489: DNA225584, NM_001154,
gen.NM_001154
Figure 1490: PRO36047
Figure 1491: DNA324516, NM_024900,
gen.NM_024900
Figure 1492: PRO81171
Figure 1493: DNA324517, XM_040752,
gen.XM_040752
Figure 1494: DNA324518, NM_002413,
gen.NM_002413
Figure 1495: PRO60956
Figure 1496: DNA324519, XM_114401,
gen.XM_114401

Figure 1497: DNA324520, XM_068164,
gen.XM_068164
Figure 1498: PRO81174
Figure 1499: DNA324521, XM_060067,
gen.XM_060067
Figure 1500: DNA324522, XM_003555,
gen.XM_003555
Figure 1501: PRO81176
Figure 1502: DNA324523, XM_034321,
gen.XM_034321
Figure 1503: PRO81177
Figure 1504: DNA324524, NM_006439,
gen.NM_006439
Figure 1505: PRO81178
Figure 1506: DNA324525, NM_001006,
gen.NM_001006
Figure 1507: PRO81179
Figure 1508: DNA227575, NM_005141,
gen.NM_005141
Figure 1509: PRO38038
Figure 1510: DNA324526, XM_114368,
gen.XM_114368
Figure 1511A-B: DNA225920, NM_000508,
gen.NM_000508
Figure 1512: PRO36383
Figure 1513: DNA324527, NM_021871,
gen.NM_021871
Figure 1514: PRO81181
Figure 1515: DNA225921, NM_000509,
gen.NM_000509
Figure 1516: PRO36384
Figure 1517: DNA324528, NM_021870,
gen.NM_021870
Figure 1518: PRO81182
Figure 1519: DNA324529, XM_059623,
gen.XM_059623
Figure 1520: DNA324530, XM_106246,
gen.XM_106246
Figure 1521: PRO81184
Figure 1522: DNA324531, NM_002129,
gen.NM_002129
Figure 1523: PRO81185
Figure 1524: DNA324532, XM_040321,
gen.XM_040321
Figure 1525: DNA324533, XM_015563,
gen.XM_015563
Figure 1526: DNA324534, NM_024748,
gen.NM_024748
Figure 1527: PRO81188
Figure 1528: DNA324535, XM_165470,
gen.XM_165470
Figure 1529: PRO81189
Figure 1530A-E: DNA324536, XM_003477,
gen.XM_003477
Figure 1531: DNA324537, XM_165465,
gen.XM_165465

Figure 1532: DNA324538, XM_116204,
gen.XM_116204
Figure 1533: DNA324539, XM_116205,
gen.XM_116205
Figure 1534: DNA324540, XM_098405,
gen.XM_098405
Figure 1535: DNA324541, XM_052313,
gen.XM_052313
Figure 1536: PRO81195
Figure 1537: DNA324542, XM_087659,
gen.XM_087659
Figure 1538: PRO81196
Figure 1539: DNA324543, XM_029096,
gen.XM_029096
Figure 1540: DNA324544, XM_003825,
gen.XM_003825
Figure 1541: DNA324545, XM_057994,
gen.XM_057994
Figure 1542: PRO81199
Figure 1543: DNA324546, XM_087686,
gen.XM_087686
Figure 1544: DNA324547, XM_017641,
gen.XM_017641
Figure 1545: DNA324548, NM_030782,
gen.NM_030782
Figure 1546: PRO81202
Figure 1547: DNA324549, XM_084168,
gen.XM_084168
Figure 1548: DNA324550, XM_057492,
gen.XM_057492
Figure 1549: DNA324551, XM_087597,
gen.XM_087597
Figure 1550: DNA324552, XM_087601,
gen.XM_087601
Figure 1551: DNA324554, XM_087599,
gen.XM_087599
Figure 1552: DNA324555, XM_114435,
gen.XM_114435
Figure 1553: DNA324556, XM_087600,
gen.XM_087600
Figure 1554: DNA324557, XM_016170,
gen.XM_016170
Figure 1555: DNA324558, XM_114434,
gen.XM_114434
Figure 1556: DNA324559, XM_113452,
gen.XM_113452
Figure 1557: DNA324560, XM_071580,
gen.XM_071580
Figure 1558: PRO81213
Figure 1559: DNA324561, XM_087713,
gen.XM_087713
Figure 1560: PRO81214
Figure 1561: DNA324562, XM_094440,
gen.XM_094440
Figure 1562: DNA324563, XM_106739,
gen.XM_106739

31

Figure 1563: PRO81216
Figure 1564: DNA324564, XM_087614, gen.XM_087614
Figure 1565: DNA324565, XM_004009, gen.XM_004009
Figure 1566: PRO81219
Figure 1567: DNA324566, XM_114437, gen.XM_114437
Figure 1568: DNA324567, XM_043771, gen.XM_043771
Figure 1569: PRO81221
Figure 1570: DNA324568, NM_000997, gen.NM_000997
Figure 1571: PRO11077
Figure 1572: DNA324569, XM_003869, gen.XM_003869
Figure 1573: DNA227173, NM_001465, gen.NM_001465
Figure 1574: PRO37636
Figure 1575: DNA324570, NM_018034, gen.NM_018034
Figure 1576: PRO81223
Figure 1577: DNA324571, NM_032637, gen.NM_032637
Figure 1578: PRO81224
Figure 1579: DNA324572, NM_005983, gen.NM_005983
Figure 1580: PRO81225
Figure 1581A-B: DNA324573, XM_003896, gen.XM_003896
Figure 1582: DNA287282, NM_002130, gen.NM_002130
Figure 1583: PRO69554
Figure 1584: DNA324574, XM_114442, gen.XM_114442
Figure 1585: PRO81227
Figure 1586: DNA324575, XM_114439, gen.XM_114439
Figure 1587: DNA324576, XM_114440, gen.XM_114440
Figure 1588A-B: DNA324577, XM_032902, gen.XM_032902
Figure 1589: PRO81230
Figure 1590: DNA324578, XM_032895, gen.XM_032895
Figure 1591: DNA324579, XM_084179, gen.XM_084179
Figure 1592: DNA324580, XM_041712, gen.XM_041712
Figure 1593: DNA324581, XM_116439, gen.XM_116439
Figure 1594: PRO81234
Figure 1595: DNA324582, XM_087611, gen.XM_087611
Figure 1596: DNA324583, XM_059653, gen.XM_059653

Figure 1597: DNA324584, XM_087610, gen.XM_087610
Figure 1598: DNA288259, NM_031966, gen.NM_031966
Figure 1599: PRO4676
Figure 1600: DNA324585, XM_042025, gen.XM_042025
Figure 1601: PRO81238
Figure 1602: DNA324586, NM_005713, gen.NM_005713
Figure 1603: PRO81239
Figure 1604: DNA324587, XM_059709, gen.XM_059709
Figure 1605: PRO81240
Figure 1606: DNA324588, XM_116447, gen.XM_116447
Figure 1607: PRO81241
Figure 1608: DNA324589, XM_037260, gen.XM_037260
Figure 1609: DNA324590, XM_098351, gen.XM_098351
Figure 1610: DNA324591, XM_098354, gen.XM_098354
Figure 1611: DNA324592, XM_098352, gen.XM_098352
Figure 1612: DNA324593, XM_166037, gen.XM_166037
Figure 1613: PRO81246
Figure 1614: DNA324594, XM_041694, gen.XM_041694
Figure 1615: DNA324595, XM_165488, gen.XM_165488
Figure 1616: PRO81248
Figure 1617: DNA324596, XM_059669, gen.XM_059669
Figure 1618: PRO81249
Figure 1619: DNA324597, XM_027964, gen.XM_027964
Figure 1620: PRO81250
Figure 1621: DNA324598, XM_088020, gen.XM_088020
Figure 1622: DNA324599, XM_117387, gen.XM_117387
Figure 1623: DNA324600, XM_114469, gen.XM_114469
Figure 1624: DNA324601, NM_001207, gen.NM_001207
Figure 1625: PRO22771
Figure 1626A-B: DNA324602, XM_032553, gen.XM_032553
Figure 1627: DNA254147, NM_000521, gen.NM_000521
Figure 1628: PRO49262
Figure 1629: DNA324603, NM_031482, gen.NM_031482
Figure 1630: PRO81254

Figure 1631: DNA324604, XM_087790,
gen.XM_087790
Figure 1632: DNA324605, NM_001025,
gen.NM_001025
Figure 1633: PRO10685
Figure 1634: DNA324606, XM_098362,
gen.XM_098362
Figure 1635: PRO81256
Figure 1636: DNA324607, NM_003401,
gen.NM_003401
Figure 1637: PRO70327
Figure 1638: DNA290231, NM_022550,
gen.NM_022550
Figure 1639: PRO70327
Figure 1640: DNA324608, XM_017857,
gen.XM_017857
Figure 1641: DNA324609, XM_117398,
gen.XM_117398
Figure 1642A-B: DNA257253, NM_032280,
gen.NM_032280
Figure 1643: PRO51851
Figure 1644: DNA324610, XM_003771,
gen.XM_003771
Figure 1645: PRO81259
Figure 1646A-B: DNA269816, NM_002397,
gen.NM_002397
Figure 1647: PRO58219
Figure 1648: DNA324611, XM_116427,
gen.XM_116427
Figure 1649: PRO81260
Figure 1650: DNA324612, NM_004772,
gen.NM_004772
Figure 1651: PRO81261
Figure 1652: DNA324613, XM_016674,
gen.XM_016674
Figure 1653: PRO81262
Figure 1654: DNA324614, XM_113463,
gen.XM_113463
Figure 1655: DNA324615, XM_034744,
gen.XM_034744
Figure 1656: DNA324616, XM_087745,
gen.XM_087745
Figure 1657: PRO81264
Figure 1658: DNA324617, XM_018473,
gen.XM_018473
Figure 1659: PRO81265
Figure 1660: DNA324618, XM_087635,
gen.XM_087635
Figure 1661: PRO81266
Figure 1662: DNA324619, XM_087637,
gen.XM_087637
Figure 1663: DNA324620, XM_166027,
gen.XM_166027
Figure 1664: DNA324621, NM_014035,
gen.NM_014035
Figure 1665: PRO1285

Figure 1666: DNA324622, XM_003830,
gen.XM_003830
Figure 1667: PRO81269
Figure 1668: DNA324623, XM_037002,
gen.XM_037002
Figure 1669: DNA324624, XM_166026,
gen.XM_166026
Figure 1670: DNA324625, XM_041059,
gen.XM_041059
Figure 1671: DNA83020, NM_000358,
gen.NM_000358
Figure 1672: PRO2561
Figure 1673: DNA324626, NM_003687,
gen.NM_003687
Figure 1674: PRO81272
Figure 1675: DNA324627, XM_034862,
gen.XM_034862
Figure 1676: PRO34544
Figure 1677: DNA103380, NM_003374,
gen.NM_003374
Figure 1678: PRO4710
Figure 1679: DNA324628, XM_017474,
gen.XM_017474
Figure 1680: PRO63082
Figure 1681A-B: DNA324629, NM_014829,
gen.NM_014829
Figure 1682: PRO81273
Figure 1683A-B: DNA324630, XM_114482,
gen.XM_114482
Figure 1684: PRO81274
Figure 1685: DNA324631, NM_004893,
gen.NM_004893
Figure 1686: PRO81275
Figure 1687: DNA269809, NM_006805,
gen.NM_006805
Figure 1688: PRO58213
Figure 1689: DNA226872, NM_001964,
gen.NM_001964
Figure 1690: PRO37335
Figure 1691: DNA324632, XM_116307,
gen.XM_116307
Figure 1692: PRO81276
Figure 1693: DNA324633, NM_004134,
gen.NM_004134
Figure 1694: PRO81277
Figure 1695: DNA324634, XM_038221,
gen.XM_038221
Figure 1696: PRO81278
Figure 1697: DNA271931, NM_005754,
gen.NM_005754
Figure 1698: PRO60207
Figure 1699: DNA324635, XM_003841,
gen.XM_003841
Figure 1700: DNA324636, XM_032759,
gen.XM_032759
Figure 1701: DNA324637, XM_017591,

gen.XM_017591
Figure 1702: DNA324638, NM_006058,
gen.NM_006058
Figure 1703: PRO81280
Figure 1704: DNA324639, NM_002084,·
gen.NM_002084
Figure 1705: PRO81281
Figure 1706: DNA324640, NM_018047,
gen.NM_018047
Figure 1707: PRO81282
Figure 1708: DNA324641, NM_005617,
gen.NM_005617
Figure 1709: PRO10849
Figure 1710: DNA324642, XM_003937,
gen.XM_003937
Figure 1711: DNA324643, XM_087621,
gen.XM_087621
Figure 1712A-B: DNA324644, XM_003789,
gen.XM_003789
Figure 1713: DNA324645, XM_087652,
gen.XM_087652
Figure 1714: DNA324646, XM_068853,
gen.XM_068853
Figure 1715: PRO81286
Figure 1716: DNA324647, XM_116465,
gen.XM_116465
Figure 1717: PRO81287
Figure 1718: DNA302020, NM_005573,
gen.NM_005573
Figure 1719: PRO70993
Figure 1720: DNA324648, XM_113467,
gen.XM_113467
Figure 1721: DNA271626, NM_014773,
gen.NM_014773
Figure 1722: PRO59913
Figure 1723A-B: DNA324649, XM_056315,
gen.XM_056315
Figure 1724: DNA324650, NM_024668,
gen.NM_024668
Figure 1725: PRO81289
Figure 1726: DNA324651, NM_080670,
gen.NM_080670
Figure 1727: PRO81290
Figure 1728A-B: DNA324652, NM_002588,
gen.NM_002588
Figure 1729: PRO81291
Figure 1730A-B: DNA324653, NM_003735,
gen.NM_003735
Figure 1731: PRO81292
Figure 1732A-B: DNA150679, NM_003736,
gen.NM_003736
Figure 1733: PRO12416
Figure 1734A-B: DNA324654, NM_018912,
gen.NM_018912
Figure 1735: PRO36058
Figure 1736A-B: DNA324655, NM_018913,

gen.NM_018913
Figure 1737: PRO81293
Figure 1738A-B: DNA324656, NM_018914,
gen.NM_018914
Figure 1739: PRO81294
Figure 1740A-B: DNA324657, NM_018915,
gen.NM_018915
Figure 1741: PRO36020
Figure 1742A-B: DNA324658, NM_018916,
gen.NM_018916
Figure 1743: PRO81295
Figure 1744A-B: DNA324659, NM_018917,
gen.NM_018917
Figure 1745: PRO81296
Figure 1746A-B: DNA324660, NM_018918,
gen.NM_018918
Figure 1747: PRO81297
Figure 1748A-B: DNA324661, NM_018919,
gen.NM_018919
Figure 1749: PRO81298
Figure 1750A-B: DNA324662, NM_018920,·
gen.NM_018920
Figure 1751: PRO81299
Figure 1752A-B: DNA324663, NM_018921,
gen.NM_018921
Figure 1753: PRO81300
Figure 1754A-B: DNA324664, NM_018922,
gen.NM_018922
Figure 1755: PRO81301
Figure 1756A-B: DNA324665, NM_018923,
gen.NM_018923
Figure 1757: PRO81302
Figure 1758A-B: DNA324666, NM_018924,·
gen.NM_018924
Figure 1759: PRO81303
Figure 1760A-B: DNA324667, NM_018925,
gen.NM_018925
Figure 1761: PRO81304
Figure 1762A-B: DNA324668, NM_018926,
gen.NM_018926
Figure 1763: PRO81305
Figure 1764A-B: DNA324669, NM_018927,
gen.NM_018927
Figure 1765: PRO37091
Figure 1766A-B: DNA324670, NM_018928,
gen.NM_018928
Figure 1767: PRO81306
Figure 1768A-B: DNA324671, NM_018929,
gen.NM_018929
Figure 1769: PRO81307
Figure 1770A-B: DNA324672, NM_032088,
gen.NM_032088
Figure 1771: PRO81308
Figure 1772A-B: DNA324673, NM_032092,
gen.NM_032092
Figure 1773: PRO81309

34

Figure 1774: DNA324674, NM_032403,
gen.NM_032403
Figure 1775: PRO81310
Figure 1776: DNA324675, NM_032402,
gen.NM_032402
Figure 1777: PRO81311
Figure 1778: DNA324676, XM_098387,
gen.XM_098387
Figure 1779: DNA324677, NM_002109,
gen.NM_002109
Figure 1780: PRO4908
Figure 1781: DNA324678, XM_084180,
gen.XM_084180
Figure 1782: PRO81313
Figure 1783: DNA324679, XM_039975,
gen.XM_039975
Figure 1784: PRO81314
Figure 1785: DNA324680, NM_033551,
gen.NM_033551
Figure 1786: PRO81315
Figure 1787: DNA324681, NM_004821,
gen.NM_004821
Figure 1788: PRO81316
Figure 1789: DNA324682, XM_068395,
gen.XM_068395
Figure 1790: PRO81317
Figure 1791: DNA226418, NM_004060,
gen.NM_004060
Figure 1792: PRO36881
Figure 1793A-B: DNA324683, XM_056963,
gen.XM_056963
Figure 1794: PRO81318
Figure 1795: DNA324684, NM_004219,
gen.NM_004219
Figure 1796: PRO81319
Figure 1797: DNA324685, XM_094243,
gen.XM_094243
Figure 1798A-B: DNA324686, XM_047964,
gen.XM_047964
Figure 1799: DNA324687, XM_016345,
gen.XM_016345
Figure 1800: DNA324688, NM_002887,
gen.NM_002887
Figure 1801: PRO81323
Figure 1802: DNA324689, XM_166029,
gen.XM_166029
Figure 1803: DNA324690, NM_002520,
gen.NM_002520
Figure 1804: PRO58993
Figure 1805: DNA324691, XM_043340,
gen.XM_043340
Figure 1806: PRO81325
Figure 1807: DNA324692, XM_116340,
gen.XM_116340
Figure 1808A-B: DNA324693, XM_043388,
gen.XM_043388

Figure 1809: PRO81327
Figure 1810: DNA324694, XM_116856,
gen.XM_116856
Figure 1811: DNA324695, XM_003716,
gen.XM_003716
Figure 1812: DNA227320, NM_003714,
gen.NM_003714
Figure 1813: PRO37783
Figure 1814: DNA324696, NM_032361,
gen.NM_032361
Figure 1815: PRO81330
Figure 1816: DNA324697, XM_087773,
gen.XM_087773
Figure 1817: DNA324698, XM_114457,
gen.XM_114457
Figure 1818: DNA324699, XM_165483,
gen.XM_165483
Figure 1819: DNA324700, XM_114453,
gen.XM_114453
Figure 1820: DNA324701, XM_165484,
gen.XM_165484
Figure 1821: DNA324702, XM_030771,
gen.XM_030771
Figure 1822: PRO19615
Figure 1823: DNA324703, XM_030777,
gen.XM_030777
Figure 1824: DNA324704, XM_030782,
gen.XM_030782
Figure 1825: PRO81336
Figure 1826: DNA324705, NM_030567,
gen.NM_030567
Figure 1827: PRO81337
Figure 1828: DNA225909, NM_000505,
gen.NM_000505
Figure 1829: PRO36372
Figure 1830: DNA274206, NM_006816,
gen.NM_006816
Figure 1831: PRO62135
Figure 1832: DNA324706, NM_031300,
gen.NM_031300
Figure 1833: PRO81338
Figure 1834: DNA324707, NM_013237,
gen.NM_013237
Figure 1835: PRO81339
Figure 1836: DNA324708, NM_002011,
gen.NM_002011
Figure 1837: PRO81340
Figure 1838: DNA324709, NM_022963,
gen.NM_022963
Figure 1839: PRO81341
Figure 1840: DNA324710, XM_038946,
gen.XM_038946
Figure 1841: DNA324711, XM_113454,
gen.XM_113454
Figure 1842: DNA324712, XM_166028,
gen.XM_166028

35

Figure 1843: DNA324713, NM_015043, gen.NM_015043
Figure 1844: PRO81345
Figure 1845: DNA324714, XM_113468, gen.XM_113468
Figure 1846: DNA324715, NM_014275, gen.NM_014275
Figure 1847: PRO1927
Figure 1848: DNA324716, NM_054013, gen.NM_054013
Figure 1849: PRO81347
Figure 1850: DNA270675, NM_005520, gen.NM_005520
Figure 1851: PRO59040
Figure 1852: DNA324717, NM_006098, gen.NM_006098
Figure 1853: PRO25849
Figure 1854: DNA269593, NM_005110, gen.NM_005110
Figure 1855: PRO58006
Figure 1856: DNA324718, XM_116365, gen.XM_116365
Figure 1857: DNA324719, XM_116511, gen.XM_116511
Figure 1858: DNA324720, XM_087823, gen.XM_087823
Figure 1859A-C: DNA324721, XM_053955, gen.XM_053955
Figure 1860: DNA324722, XM_113476, gen.XM_113476
Figure 1861: DNA324723, XM_116514, gen.XM_116514
Figure 1862: DNA324724, XM_094741, gen.XM_094741
Figure 1863: DNA324725, NM_025168, gen.NM_025168
Figure 1864: PRO81354
Figure 1865A-B: DNA324726, XM_165740, gen.XM_165740
Figure 1866: DNA272171, NM_002388, gen.NM_002388
Figure 1867: PRO60438
Figure 1868: DNA324727, XM_167169, gen.XM_167169
Figure 1869: PRO81355
Figure 1870: DNA324728, NM_014452, gen.NM_014452
Figure 1871: PRO868
Figure 1872: DNA324729, XM_166349, gen.XM_166349
Figure 1873: PRO81356
Figure 1874: DNA304680, NM_007355, gen.NM_007355
Figure 1875: PRO71106
Figure 1876: DNA324730, XM_165772, gen.XM_165772

Figure 1877: DNA324731, XM_168123, gen.XM_168123
Figure 1878: DNA324732, XM_166457, gen.XM_166457
Figure 1879: DNA324733, XM_166469, gen.XM_166469
Figure 1880: DNA324734, NM_018135, gen.NM_018135
Figure 1881: PRO81359
Figure 1882A-B: DNA324735, XM_166340, gen.XM_166340
Figure 1883: DNA324736, XM_087960, gen.XM_087960
Figure 1884: DNA324737, XM_166362, gen.XM_166362
Figure 1885: PRO81362
Figure 1886: DNA227204, NM_015388, gen.NM_015388
Figure 1887: PRO37667
Figure 1888: DNA324738, XM_166425, gen.XM_166425
Figure 1889: PRO81363
Figure 1890: DNA324739, NM_057161, gen.NM_057161
Figure 1891: PRO81364
Figure 1892: DNA270613, NM_006245, gen.NM_006245
Figure 1893: PRO58984
Figure 1894: DNA324740, NM_006586, gen.NM_006586
Figure 1895: PRO81365
Figure 1896: DNA324741, XM_166402, gen.XM_166402
Figure 1897: PRO81366
Figure 1898: DNA324742, NM_001760, gen.NM_001760
Figure 1899: PRO81367
Figure 1900: DNA287246, NM_004053, gen.NM_004053
Figure 1901: PRO69521
Figure 1902: DNA324743, NM_017601, gen.NM_017601
Figure 1903: PRO81368
Figure 1904: DNA275630, NM_006708, gen.NM_006708
Figure 1905: PRO63253
Figure 1906: DNA324744, NM_014341, gen.NM_014341
Figure 1907: PRO81369
Figure 1908: DNA304460, NM_016059, gen.NM_016059
Figure 1909: PRO4984
Figure 1910: DNA324745, XM_166412, gen.XM_166412
Figure 1911: PRO81370
Figure 1912: DNA304716, NM_078467,

gen.NM_078467
Figure 1913: PRO71142
Figure 1914: DNA324746, XM_166417,
gen.XM_166417
Figure 1915: PRO81371
Figure 1916A-B: DNA324747, NM_003137,
gen.NM_003137
Figure 1917: PRO81372
Figure 1918A-B: DNA324748, NM_004117,
gen.NM_004117
Figure 1919: PRO36841
Figure 1920: DNA324749, XM_166419,
gen.XM_166419
Figure 1921: DNA324750, XM_165794,
gen.XM_165794
Figure 1922: DNA324751, NM_007104,
gen.NM_007104
Figure 1923: PRO10360
Figure 1924: DNA324752, NM_024294,
gen.NM_024294
Figure 1925: PRO81375
Figure 1926: DNA324753, NM_022758,
gen.NM_022758
Figure 1927: PRO50582
Figure 1928: DNA324754, XM_168070,
gen.XM_168070
Figure 1929: DNA324755, NM_012391,
gen.NM_012391
Figure 1930: PRO81377
Figure 1931: DNA324756, XM_166459,
gen.XM_166459
Figure 1932: DNA324757, XM_166333,
gen.XM_166333
Figure 1933: PRO81379
Figure 1934: DNA324758, XM_058039,
gen.XM_058039
Figure 1935: PRO81380
Figure 1936: DNA324759, XM_087990,
gen.XM_087990
Figure 1937: DNA324760, XM_165743,
gen.XM_165743
Figure 1938: DNA324761, XM_166360,
gen.XM_166360
Figure 1939: DNA324763, XM_059801,
gen.XM_059801
Figure 1940: DNA324764, XM_166363,
gen.XM_166363
Figure 1941: DNA324765, XM_016857,
gen.XM_016857
Figure 1942: DNA227442, NM_001350,
gen.NM_001350
Figure 1943: PRO37905
Figure 1944: DNA324766, NM_005452,
gen.NM_005452
Figure 1945: PRO81387
Figure 1946: DNA304661, NM_022551,

gen.NM_022551
Figure 1947: PRO71088
Figure 1948: DNA324767, XM_165747,
gen.XM_165747
Figure 1949: DNA324768, XM_165698,
gen.XM_165698
Figure 1950: PRO4884
Figure 1951A-B: DNA324769, XM_165770,
gen.XM_165770
Figure 1952: DNA287227, NM_004159,
gen.NM_004159
Figure 1953: PRO69506
Figure 1954: DNA324770, XM_165717,
gen.XM_165717
Figure 1955: DNA324771, XM_166480,
gen.XM_166480
Figure 1956: DNA324772, XM_165801,
gen.XM_165801
Figure 1957A-B: DNA324773, NM_000592,
gen.NM_000592
Figure 1958: PRO36316
Figure 1959: DNA324774, NM_001710,
gen.NM_001710
Figure 1960: PRO36305
Figure 1961: DNA227607, NM_005346,
gen.NM_005346
Figure 1962: PRO38070
Figure 1963: DNA304668, NM_005345,
gen.NM_005345
Figure 1964: PRO71095
Figure 1965: DNA324775, NM_021177,
gen.NM_021177
Figure 1966: PRO81394
Figure 1967A-B: DNA272263, NM_006295,
gen.NM_006295
Figure 1968: PRO70138
Figure 1969: DNA287319, NM_001288,
gen.NM_001288
Figure 1970: PRO69584
Figure 1971: DNA324776, NM_001320,
gen.NM_001320
Figure 1972: PRO63052
Figure 1973A-B: DNA324777, NM_004639,
gen.NM_004639
Figure 1974: PRO81395
Figure 1975A-B: DNA324778, NM_080703,
gen.NM_080703
Figure 1976: PRO81396
Figure 1977A-B: DNA324779, NM_080702,
gen.NM_080702
Figure 1978: PRO81397
Figure 1979A-B: DNA324780, NM_004638,
gen.NM_004638
Figure 1980: PRO81398
Figure 1981A-B: DNA324781, NM_080686,
gen.NM_080686

Figure 1982: PRO81399
Figure 1983: DNA324782, XM_165771,
gen.XM_165771
Figure 1984: DNA324783, NM_080598,
gen.NM_080598
Figure 1985: PRO71125
Figure 1986: DNA304699, NM_004640,
gen.NM_004640
Figure 1987: PRO71125
Figure 1988: DNA324784, XM_165765,
gen.XM_165765
Figure 1989: PRO81400
Figure 1990: DNA324785, XM_087945,
gen.XM_087945
Figure 1991: PRO81401
Figure 1992: DNA324786, XM_166381,
gen.XM_166381
Figure 1993: PRO81402
Figure 1994: DNA324787, XM_168104,
gen.XM_168104
Figure 1995: DNA324788, XM_166401,
gen.XM_166401
Figure 1996: PRO81404
Figure 1997: DNA271040, NM_001517,
gen.NM_001517
Figure 1998: PRO59365
Figure 1999A-B: DNA324789, XM_165738,
gen.XM_165738
Figure 2000: DNA324790, XM_087939,
gen.XM_087939
Figure 2001: PRO81406
Figure 2002: DNA324791, XM_166353,
gen.XM_166353
Figure 2003: PRO1112
Figure 2004A-B: DNA324792, XM_166376,
gen.XM_166376
Figure 2005: PRO81407
Figure 2006A-B: DNA324793, XM_165799,
gen.XM_165799
Figure 2007: DNA290264, NM_025263,
gen.NM_025263
Figure 2008: PRO70393
Figure 2009: DNA324794, XM_166361,
gen.XM_166361
Figure 2010: PRO81409
Figure 2011: DNA324795, XM_165764,
gen.XM_165764
Figure 2012: PRO81410
Figure 2013: DNA324796, XM_165758,
gen.XM_165758
Figure 2014: PRO81411
Figure 2015: DNA324797, XM_166406,
gen.XM_166406
Figure 2016: DNA324798, XM_165809,
gen.XM_165809
Figure 2017: DNA324799, NM_018950,

gen.NM_018950
Figure 2018: PRO81414
Figure 2019: DNA324800, XM_166392,
gen.XM_166392
Figure 2020: PRO81415
Figure 2021: DNA324801, XM_166336,
gen.XM_166336
Figure 2022: PRO81416
Figure 2023: DNA324802, XM_167128,
gen.XM_167128
Figure 2024: PRO23797
Figure 2025: DNA324803, XM_167161,
gen.XM_167161
Figure 2026: PRO81417
Figure 2027: DNA324804, NM_013375,
gen.NM_013375
Figure 2028: PRO81418
Figure 2029: DNA324805, NM_007047,
gen.NM_007047
Figure 2030: PRO81419
Figure 2031: DNA324806, XM_167179,
gen.XM_167179
Figure 2032: DNA290785, NM_003107,
gen.NM_003107
Figure 2033: PRO70544
Figure 2034: DNA150772, NM_003472,
gen.NM_003472
Figure 2035: PRO12797
Figure 2036A-B: DNA324807, XM_165728,
gen.XM_165728
Figure 2037: DNA324808, XM_165749,
gen.XM_165749
Figure 2038: PRO81421
Figure 2039A-B: DNA324809, NM_004973,
gen.NM_004973
Figure 2040: PRO81422
Figure 2041: DNA324810, XM_167196,
gen.XM_167196
Figure 2042: DNA324811, XM_166446,
gen.XM_166446
Figure 2043: PRO81424
Figure 2044A-C: DNA324812, XM_165777,
gen.XM_165777
Figure 2045: DNA324813, XM_037875,
gen.XM_037875
Figure 2046: PRO81426
Figure 2047: DNA324814, XM_167225,
gen.XM_167225
Figure 2048: PRO81427
Figure 2049: DNA324815, XM_166357,
gen.XM_166357
Figure 2050: DNA324816, NM_001069,
gen.NM_001069
Figure 2051: PRO81429
Figure 2052: DNA324817, NM_001500,
gen.NM_001500

Figure 2121: DNA324859, XM_049899, gen.XM_049899

Figure 2122: DNA324860, XM_004379, gen.XM_004379

Figure 2123A-C: DNA324861, XM_087834, gen.XM_087834

Figure 2124A-B: DNA324862, XM_087836, gen.XM_087836

Figure 2125: PRO81471

Figure 2126: DNA324863, NM_005389, gen.NM_005389

Figure 2127: PRO66279

Figure 2128A-C: DNA324864, XM_029746, gen.XM_029746

Figure 2129: PRO66282

Figure 2130: DNA324865, XM_004383, gen.XM_004383

Figure 2131: DNA324866, XM_059745, gen.XM_059745

Figure 2132: DNA324867, XM_033912, gen.XM_033912

Figure 2133: PRO81474

Figure 2134: DNA324868, XM_033910, gen.XM_033910

Figure 2135: DNA324870, NM_003181, gen.NM_003181

Figure 2136: PRO81476

Figure 2137: DNA324871, NM_002793, gen.NM_002793

Figure 2138: PRO81477

Figure 2139: DNA324872, XM_044866, gen.XM_044866

Figure 2140: DNA324873, XM_116524, gen.XM_116524

Figure 2141: DNA324874, XM_059773, gen.XM_059773

Figure 2142: DNA324875, XM_084998, gen.XM_084998

Figure 2143: PRO81481

Figure 2144: DNA324876, XM_058266, gen.XM_058266

Figure 2145: DNA324877, XM_042422, gen.XM_042422

Figure 2146A-B: DNA324878, XM_054706, gen.XM_054706

Figure 2147: DNA324879, XM_166049, gen.XM_166049

Figure 2148: DNA324880, XM_042473, gen.XM_042473

Figure 2149: PRO81486

Figure 2150: DNA324881, XM_167046, gen.XM_167046

Figure 2151: PRO23797

Figure 2152: DNA324882, XM_071937, gen.XM_071937

Figure 2153: PRO81487

Figure 2154: DNA324883, XM_087991, gen.XM_087991

Figure 2155: DNA324884, NM_005514, gen.NM_005514

Figure 2156: PRO81490

Figure 2157: DNA324885, XM_166327, gen.XM_166327

Figure 2158: PRO81491

Figure 2159: DNA324886, XM_165692, gen.XM_165692

Figure 2160: DNA324887, XM_117449, gen.XM_117449

Figure 2161: DNA324888, XM_086428, gen.XM_086428

Figure 2162: PRO81494

Figure 2163: DNA324889, NM_032350, gen.NM_032350

Figure 2164: PRO81495

Figure 2165: DNA324890, NM_013393, gen.NM_013393

Figure 2166: PRO81496

Figure 2167: DNA324891, XM_165860, gen.XM_165860

Figure 2168: DNA324892, XM_166541, gen.XM_166541

Figure 2169: PRO81498

Figure 2170A-B: DNA324893, XM_166523, gen.XM_166523

Figure 2171: PRO81499

Figure 2172: DNA324894, NM_016003, gen.NM_016003

Figure 2173: PRO81500

Figure 2174: DNA225631, NM_001101, gen.NM_001101

Figure 2175: PRO36094

Figure 2176: DNA274326, NM_003088, gen.NM_003088

Figure 2177: PRO62244

Figure 2178: DNA324895, NM_006303, gen.NM_006303

Figure 2179: PRO81501

Figure 2180: DNA324896, NM_014413, gen.NM_014413

Figure 2181: PRO60579

Figure 2182: DNA247595, NM_006908, gen.NM_006908

Figure 2183: PRO45014

Figure 2184: DNA324897, NM_006854, gen.NM_006854

Figure 2185: PRO12468

Figure 2186: DNA324898, NM_024067, gen.NM_024067

Figure 2187: PRO81502

Figure 2188: DNA324899, NM_002947, gen.NM_002947

Figure 2189: PRO81503

Figure 2190: DNA324900, XM_166531, gen.XM_166531
Figure 2191: DNA324901, XM_166540, gen.XM_166540
Figure 2192: PRO81505
Figure 2193: DNA193955, NM_002489, gen.NM_002489
Figure 2194: PRO23362
Figure 2195: DNA324902, XM_088264, gen.XM_088264
Figure 2196: PRO81506
Figure 2197: DNA324903, XM_165841, gen.XM_165841
Figure 2198: DNA324904, XM_166521, gen.XM_166521
Figure 2199: PRO81508
Figure 2200: DNA324905, XM_166506, gen.XM_166506
Figure 2201: PRO81509
Figure 2202: DNA324906, XM_166505, gen.XM_166505
Figure 2203: DNA324907, XM_166514, gen.XM_166514
Figure 2204: DNA324908, XM_166515, gen.XM_166515
Figure 2205: DNA324909, XM_166512, gen.XM_166512
Figure 2206: DNA227929, NM_019059, gen.NM_019059
Figure 2207: PRO38392
Figure 2208A-B: DNA324910, NM_018947, gen.NM_018947
Figure 2209: PRO81514
Figure 2210: DNA324911, NM_002137, gen.NM_002137
Figure 2211: PRO81515
Figure 2212: DNA324912, NM_031243, gen.NM_031243
Figure 2213: PRO6373
Figure 2214: DNA324913, NM_007276, gen.NM_007276
Figure 2215: PRO81516
Figure 2216: DNA324914, NM_016587, gen.NM_016587
Figure 2217: PRO81517
Figure 2218: DNA324915, XM_040853, gen.XM_040853
Figure 2219: DNA324916, XM_166509, gen.XM_166509
Figure 2220: DNA324917, XM_166513, gen.XM_166513
Figure 2221: PRO81520
Figure 2222: DNA324918, XM_166504, gen.XM_166504
Figure 2223: PRO81521
Figure 2224: DNA324919, XM_166494,

gen.XM_166494
Figure 2225: DNA324920, XM_107825, gen.XM_107825
Figure 2226A-B: DNA324921, NM_022748, gen.NM_022748
Figure 2227: PRO81523
Figure 2228: DNA324922, NM_000598, gen.NM_000598
Figure 2229: PRO119
Figure 2230A-B: DNA324923, XM_166594, gen.XM_166594
Figure 2231: PRO81524
Figure 2232A-B: DNA275334, NM_030900, gen.NM_030900
Figure 2233: PRO63009
Figure 2234: DNA324924, NM_031443, gen.NM_031443
Figure 2235: PRO81525
Figure 2236: DNA324925, NM_012412, gen.NM_012412
Figure 2237: PRO61812
Figure 2238: DNA324926, NM_021130, gen.NM_021130
Figure 2239: PRO7427
Figure 2240A-B: DNA324927, XM_165877, gen.XM_165877
Figure 2241: PRO81526
Figure 2242: DNA227268, NM_019082, gen.NM_019082
Figure 2243: PRO37731
Figure 2244: DNA324928, XM_015258, gen.XM_015258
Figure 2245: DNA324929, XM_165870, gen.XM_165870
Figure 2246: DNA273865, NM_006230, gen.NM_006230
Figure 2247: PRO61824
Figure 2248A-B: DNA324930, XM_165882, gen.XM_165882
Figure 2249: DNA324931, XM_165867, gen.XM_165867
Figure 2250: PRO61688
Figure 2251: DNA324932, NM_014063, gen.NM_014063
Figure 2252: PRO81529
Figure 2253: DNA324933, XM_165872, gen.XM_165872
Figure 2254: DNA304707, NM_002787, gen.NM_002787
Figure 2255: PRO71133
Figure 2256: DNA324934, XM_016733, gen.XM_016733
Figure 2257: PRO81531
Figure 2258: DNA324935, XM_165876, gen.XM_165876
Figure 2259A-B: DNA324936, NM_014800,

41

gen.NM_014800
Figure 2260: DNA324937, NM_130442,
gen.NM_130442
Figure 2261: PRO81534
Figure 2262: DNA226416, NM_000385,
gen.NM_000385
Figure 2263: PRO36879
Figure 2264A-B: DNA324938, XM_167339,
gen.XM_167339
Figure 2265: DNA287189, NM_002047,
gen.NM_002047
Figure 2266: PRO69475
Figure 2267: DNA324939, XM_170195,
gen.XM_170195
Figure 2268: PRO81536
Figure 2269: DNA324940, XM_168378,
gen.XM_168378
Figure 2270: PRO81537
Figure 2271: DNA324941, XM_168354,
gen.XM_168354
Figure 2272: PRO81538
Figure 2273: DNA324942, XM_167494,
gen.XM_167494
Figure 2274: DNA103588, NM_001762,
gen.NM_001762
Figure 2275: PRO4912
Figure 2276: DNA324943, XM_037741,
gen.XM_037741
Figure 2277: PRO81540
Figure 2278: DNA324944, XM_050265,
gen.XM_050265
Figure 2279: PRO81541
Figure 2280: DNA324945, XM_017483,
gen.XM_017483
Figure 2281A-B: DNA324946, XM_018359,
gen.XM_018359
Figure 2282: DNA324947, XM_059876,
gen.XM_059876
Figure 2283: PRO81544
Figure 2284: DNA324948, NM_032951,
gen.NM_032951
Figure 2285: PRO81545
Figure 2286: DNA324949, NM_032953,
gen.NM_032953
Figure 2287: PRO81546
Figure 2288: DNA324950, NM_022170,
gen.NM_022170
Figure 2289: PRO81547
Figure 2290: DNA324951, NM_031992,
gen.NM_031992
Figure 2291: PRO81548
Figure 2292: DNA324952, XM_004901,
gen.XM_004901
Figure 2293: DNA324953, NM_016328,
gen.NM_016328
Figure 2294: PRO81550

Figure 2295A-B: DNA324954, NM_032999,
gen.NM_032999
Figure 2296: PRO81551
Figure 2297: DNA324955, XM_088239,
gen.XM_088239
Figure 2298: PRO81552
Figure 2299A-B: DNA324956, XM_167500,
gen.XM_167500
Figure 2300A-B: DNA324957, XM_167504,
gen.XM_167504
Figure 2301: DNA324958, XM_167498,
gen.XM_167498
Figure 2302: DNA324959, XM_168454,
gen.XM_168454
Figure 2303: PRO81556
Figure 2304: DNA324960, NM_031925,
gen.NM_031925
Figure 2305: PRO81557
Figure 2306: DNA324961, NM_005918,
gen.NM_005918
Figure 2307: PRO81558
Figure 2308: DNA304710, NM_001540,
gen.NM_001540
Figure 2309: PRO71136
Figure 2310: DNA324962, XM_168470,
gen.XM_168470
Figure 2311: DNA324963, XM_168461,
gen.XM_168461
Figure 2312A-B: DNA324964, XM_167502,
gen.XM_167502
Figure 2313: DNA324965, XM_017442,
gen.XM_017442
Figure 2314: PRO81561
Figure 2315: DNA324966, XM_168450,
gen.XM_168450
Figure 2316: DNA324967, XM_168435,
gen.XM_168435
Figure 2317: DNA324968, XM_168464,
gen.XM_168464
Figure 2318: DNA324969, XM_170427,
gen.XM_170427
Figure 2319A-B: DNA324971, NM_015068,
gen.NM_015068
Figure 2320: PRO81566
Figure 2321A-B: DNA324972, XM_167476,
gen.XM_167476
Figure 2322: DNA324973, XM_168181,
gen.XM_168181
Figure 2323: DNA324974, XM_168251,
gen.XM_168251
Figure 2324: PRO81569
Figure 2325: DNA324975, XM_167477,
gen.XM_167477
Figure 2326: DNA324976, NM_005837,
gen.NM_005837
Figure 2327: PRO81571

Figure 2328: DNA324977, XM_167483, gen.XM_167483
Figure 2329: DNA324978, XM_167484, gen.XM_167484
Figure 2330: PRO81572
Figure 2331: DNA324979, NM_030935, gen.NM_030935
Figure 2332: PRO81573
Figure 2333: DNA324980, NM_019606, gen.NM_019606
Figure 2334: PRO81574
Figure 2335: DNA324981, NM_024070, gen.NM_024070
Figure 2336: PRO81575
Figure 2337: DNA324982, XM_084241, gen.XM_084241
Figure 2338: DNA324983, NM_006833, gen.NM_006833
Figure 2339: PRO22897
Figure 2340: DNA324984, NM_032164, gen.NM_032164
Figure 2341: PRO81578
Figure 2342: DNA304801, NM_004889, gen.NM_004889
Figure 2343: PRO71211
Figure 2344: DNA324985, NM_006693, gen.NM_006693
Figure 2345: PRO81579
Figure 2346: DNA324986, XM_165839, gen.XM_165839
Figure 2347: PRO81580
Figure 2348: DNA272090, NM_005720, gen.NM_005720
Figure 2349: PRO60360
Figure 2350: DNA324987, XM_165836, gen.XM_165836
Figure 2351A-B: DNA324988, XM_166482, gen.XM_166482
Figure 2352: DNA324989, XM_088180, gen.XM_088180
Figure 2353A-B: DNA324990, XM_166485, gen.XM_166485
Figure 2354: PRO81584
Figure 2355: DNA324991, NM_001673, gen.NM_001673
Figure 2356: PRO81585
Figure 2357: DNA324992, NM_133436, gen.NM_133436
Figure 2358: PRO81586
Figure 2359: DNA324993, XM_168586, gen.XM_168586
Figure 2360: PRO81587
Figure 2361: DNA83141, NM_000602, gen.NM_000602
Figure 2362: PRO2604
Figure 2363: DNA324994, NM_057089,

gen.NM_057089
Figure 2364: PRO81588
Figure 2365: DNA324995, NM_001283, gen.NM_001283
Figure 2366: PRO41882
Figure 2367: DNA324996, NM_003378, gen.NM_003378
Figure 2368: PRO81589
Figure 2369: DNA324997, NM_001084, gen.NM_001084
Figure 2370: PRO58437
Figure 2371: DNA270711, NM_006349, gen.NM_006349
Figure 2372: PRO59074
Figure 2373: DNA324998, NM_024653, gen.NM_024653
Figure 2374: PRO81590
Figure 2375: DNA324999, XM_168548, gen.XM_168548
Figure 2376: DNA325000, NM_032958, gen.NM_032958
Figure 2377: PRO81591
Figure 2378: DNA325001, NM_002803, gen.NM_002803
Figure 2379: PRO81592
Figure 2380: DNA325002, XM_168572, gen.XM_168572
Figure 2381: DNA325003, XM_071605, gen.XM_071605
Figure 2382: PRO81594
Figure 2383: DNA325004, XM_033876, gen.XM_033876
Figure 2384: PRO81595
Figure 2385A-B: DNA325005, XM_027214, gen.XM_027214
Figure 2386: DNA325006, XM_088073, gen.XM_088073
Figure 2387: DNA325007, XM_072430, gen.XM_072430
Figure 2388: PRO81598
Figure 2389: DNA325008, XM_050430, gen.XM_050430
Figure 2390: PRO81599
Figure 2391: DNA325009, NM_001753, gen.NM_001753
Figure 2392: PRO81600
Figure 2393: DNA226560, NM_006136, gen.NM_006136
Figure 2394: PRO37023
Figure 2395: DNA325010, XM_012284, gen.XM_012284
Figure 2396: DNA325011, NM_005000, gen.NM_005000
Figure 2397: PRO59380
Figure 2398: DNA325012, NM_001662, gen.NM_001662

Figure 2399: PRO39773
Figure 2400: DNA325013, XM_011618,
gen.XM_011618
Figure 2401: PRO81602
Figure 2402: DNA325014, XM_004627,
gen.XM_004627
Figure 2403: DNA325015, XM_045401,
gen.XM_045401
Figure 2404: DNA325016, XM_114602,
gen.XM_114602
Figure 2405: PRO81605
Figure 2406: DNA325017, XM_117481,
gen.XM_117481
Figure 2407A-C: DNA325018, XM_045856,
gen.XM_045856
Figure 2408: PRO81607
Figure 2409A-B: DNA325019, XM_088105,
gen.XM_088105
Figure 2410: PRO81608
Figure 2411: DNA325020, XM_011548,
gen.XM_011548
Figure 2412: PRO81609
Figure 2413: DNA325021, XM_045952,
gen.XM_045952
Figure 2414: DNA325022, XM_046001,
gen.XM_046001
Figure 2415: PRO81611
Figure 2416: DNA325023, XM_088099,
gen.XM_088099
Figure 2417: DNA325024, XM_040498,
gen.XM_040498
Figure 2418: DNA325025, XM_088103,
gen.XM_088103
Figure 2419: PRO81614
Figure 2420: DNA325026, XM_088122,
gen.XM_088122
Figure 2421: PRO81615
Figure 2422: DNA325027, XM_088119,
gen.XM_088119
Figure 2423: DNA325028, NM_001628,
gen.NM_001628
Figure 2424: PRO81617
Figure 2425: DNA325029, NM_020299,
gen.NM_020299
Figure 2426: PRO81618
Figure 2427: DNA325030, NM_024033,
gen.NM_024033
Figure 2428: PRO81619
Figure 2429: DNA325031, XM_114555,
gen.XM_114555
Figure 2430: DNA325032, XM_059839,
gen.XM_059839
Figure 2431: PRO81621
Figure 2432: DNA325033, XM_095146,
gen.XM_095146
Figure 2433: DNA325034, XM_016700,

gen.XM_016700
Figure 2434: DNA325035, XM_042781,
gen.XM_042781
Figure 2435: DNA304685, NM_003143,
gen.NM_003143
Figure 2436: PRO71111
Figure 2437: DNA325036, NM_018238,
gen.NM_018238
Figure 2438: PRO81625
Figure 2439: DNA325037, XM_035107,
gen.XM_035107
Figure 2440: DNA325038, NM_003461,
gen.NM_003461
Figure 2441: PRO10194
Figure 2442: DNA325039, NM_004911,
gen.NM_004911
Figure 2443: PRO2733
Figure 2444A-B: DNA325040, XM_114578,
gen.XM_114578
Figure 2445: PRO81627
Figure 2446: DNA325041, XM_088135,
gen.XM_088135
Figure 2447: DNA325042, XM_098654,
gen.XM_098654
Figure 2448: PRO81629
Figure 2449: DNA325043, NM_023942,
gen.NM_023942
Figure 2450: PRO81630
Figure 2451: DNA325044, NM_138434,
gen.NM_138434
Figure 2452: PRO81631
Figure 2453: DNA325045, XM_084238,
gen.XM_084238
Figure 2454A-B: DNA325046, XM_032216,
gen.XM_032216
Figure 2455A-B: DNA325047, XM_032121,
gen.XM_032121
Figure 2456: DNA325048, NM_031434,
gen.NM_031434
Figure 2457: PRO1555
Figure 2458: DNA226337, NM_005692,
gen.NM_005692
Figure 2459: PRO36800
Figure 2460: DNA325049, NM_005614,
gen.NM_005614
Figure 2461: PRO37938
Figure 2462A-B: DNA325050, NM_053043,
gen.NM_053043
Figure 2463: PRO81634
Figure 2464: DNA325051, NM_022458,
gen.NM_022458
Figure 2465: PRO81635
Figure 2466: DNA325052, XM_098669,
gen.XM_098669
Figure 2467: DNA325053, NM_017760,
gen.NM_017760

Figure 2468: PRO81637
Figure 2469: DNA325054, XM_036413, gen.XM_036413
Figure 2470A-B: DNA325055, XM_032944, gen.XM_032944
Figure 2471: DNA325056, XM_117444, gen.XM_117444
Figure 2472: DNA325057, XM_117452, gen.XM_117452
Figure 2473: DNA325058, XM_070203, gen.XM_070203
Figure 2474: PRO81641
Figure 2475: DNA325059, XM_095371, gen.XM_095371
Figure 2476: DNA325060, NM_004084, gen.NM_004084
Figure 2477: PRO2570
Figure 2478: DNA325061, NM_005217, gen.NM_005217
Figure 2479: PRO9980
Figure 2480: DNA325062, XM_070188, gen.XM_070188
Figure 2481: PRO81643
Figure 2482: DNA325063, XM_035680, gen.XM_035680
Figure 2483: DNA325064, XM_035662, gen.XM_035662
Figure 2484: PRO3344
Figure 2485: DNA325065, XM_005305, gen.XM_005305
Figure 2486: PRO81645
Figure 2487: DNA325066, XM_050293, gen.XM_050293
Figure 2488A-B: DNA325067, XM_027679, gen.XM_027679
Figure 2489: PRO81647
Figure 2490A-B: DNA325068, XM_027651, gen.XM_027651
Figure 2491: DNA274178, NM_005775, gen.NM_005775
Figure 2492: PRO62108
Figure 2493: DNA325069, XM_113557, gen.XM_113557
Figure 2494: PRO81649
Figure 2495: DNA83022, NM_001199, gen.NM_001199
Figure 2496: PRO2042
Figure 2497: DNA325070, NM_006128, gen.NM_006128
Figure 2498: PRO81650
Figure 2499: DNA325071, NM_006131, gen.NM_006131
Figure 2500: PRO81651
Figure 2501: DNA325072, NM_006132, gen.NM_006132
Figure 2502: PRO81652

Figure 2503: DNA325073, NM_025232, gen.NM_025232
Figure 2504: PRO81653
Figure 2505: DNA325074, XM_027440, gen.XM_027440
Figure 2506: DNA225671, NM_001831, gen.NM_001831
Figure 2507: PRO36134
Figure 2508: DNA325075, NM_024567, gen.NM_024567
Figure 2509: PRO81654
Figure 2510: DNA325076, NM_018250, gen.NM_018250
Figure 2511: PRO81655
Figure 2512: DNA227267, NM_018660, gen.NM_018660
Figure 2513: PRO37730
Figure 2514A-B: DNA325077, XM_095545, gen.XM_095545
Figure 2515: DNA325078, XM_088338, gen.XM_088338
Figure 2516: PRO81657
Figure 2517: DNA325079, XM_114617, gen.XM_114617
Figure 2518: PRO81658
Figure 2519: DNA325080, XM_088336, gen.XM_088336
Figure 2520: PRO81659
Figure 2521: DNA325081, XM_047083, gen.XM_047083
Figure 2522: PRO81660
Figure 2523: DNA325082, XM_114618, gen.XM_114618
Figure 2524: PRO81661
Figure 2525: DNA325083, XM_050215, gen.XM_050215
Figure 2526: DNA325084, XM_113531, gen.XM_113531
Figure 2527: DNA325085, NM_018310, gen.NM_018310
Figure 2528: PRO81664
Figure 2529: DNA325086, XM_088294, gen.XM_088294
Figure 2530: DNA325087, XM_013112, gen.XM_013112
Figure 2531: DNA325088, XM_059933, gen.XM_059933
Figure 2532: PRO1108
Figure 2533: DNA325089, XM_011629, gen.XM_011629
Figure 2534: DNA325090, NM_000930, gen.NM_000930
Figure 2535: PRO4
Figure 2536: DNA325091, NM_000931, gen.NM_000931
Figure 2537: PRO81668

45

Figure 2538: DNA325092, NM_033011, gen.NM_033011
Figure 2539: PRO81669
Figure 2540: DNA325093, XM_166063, gen.XM_166063
Figure 2541: DNA325094, NM_025070, gen.NM_025070
Figure 2542: PRO81671
Figure 2543A-B: DNA325095, XM_030268, gen.XM_030268
Figure 2544: DNA325096, XM_030274, gen.XM_030274
Figure 2545: PRO81673
Figure 2546: DNA151010, NM_003350, gen.NM_003350
Figure 2547: PRO12838
Figure 2548: DNA325097, XM_113540, gen.XM_113540
Figure 2549: PRO81674
Figure 2550: DNA325098, NM_006330, gen.NM_006330
Figure 2551: PRO59230
Figure 2552: DNA325099, NM_001023, gen.NM_001023
Figure 2553: PRO58263
Figure 2554: DNA325100, XM_095667, gen.XM_095667
Figure 2555: PRO81675
Figure 2556: DNA325101, XM_114640, gen.XM_114640
Figure 2557: DNA325102, XM_057780, gen.XM_057780
Figure 2558: DNA325103, XM_166064, gen.XM_166064
Figure 2559: DNA325104, XM_088399, gen.XM_088399
Figure 2560: DNA325105, XM_088401, gen.XM_088401
Figure 2561: DNA325106, XM_042658, gen.XM_042658
Figure 2562: DNA325107, XM_011769, gen.XM_011769
Figure 2563: DNA325108, XM_044627, gen.XM_044627
Figure 2564: DNA325109, XM_098761, gen.XM_098761
Figure 2565: DNA226496, NM_006837, gen.NM_006837
Figure 2566: PRO36959
Figure 2567: DNA325110, NM_014294, gen.NM_014294
Figure 2568: PRO23248
Figure 2569: DNA325111, NM_000971, gen.NM_000971
Figure 2570: PRO81685
Figure 2571: DNA325112, XM_050731,

gen.XM_050731
Figure 2572: DNA325113, XM_088325, gen.XM_088325
Figure 2573: PRO81687
Figure 2574: DNA325114, XM_088323, gen.XM_088323
Figure 2575: DNA325115, NM_001444, gen.NM_001444
Figure 2576: PRO81689
Figure 2577: DNA325116, XM_013127, gen.XM_013127
Figure 2578: PRO81690
Figure 2579: DNA325117, XM_165514, gen.XM_165514
Figure 2580: PRO81691
Figure 2581: DNA325118, XM_017816, gen.XM_017816
Figure 2582: DNA325119, XM_098747, gen.XM_098747
Figure 2583: DNA325120, XM_050506, gen.XM_050506
Figure 2584: DNA325121, NM_024613, gen.NM_024613
Figure 2585: PRO81695
Figure 2586: DNA325122, XM_011642, gen.XM_011642
Figure 2587: PRO81696
Figure 2588: DNA325123, NM_000989, gen.NM_000989
Figure 2589: PRO11265
Figure 2590: DNA325124, NM_003406, gen.NM_003406
Figure 2591: PRO71091
Figure 2592: DNA325125, XM_011657, gen.XM_011657
Figure 2593: DNA131588, NM_002568, gen.NM_002568
Figure 2594: PRO7445
Figure 2595: DNA325126, XM_018287, gen.XM_018287
Figure 2596: DNA325127, NM_001568, gen.NM_001568
Figure 2597: PRO81699
Figure 2598: DNA325128, NM_003756, gen.NM_003756
Figure 2599: PRO81700
Figure 2600A-B: DNA272050, NM_006265, gen.NM_006265
Figure 2601: PRO60321
Figure 2602: DNA325129, NM_052886, gen.NM_052886
Figure 2603: PRO81701
Figure 2604: DNA325130, XM_016047, gen.XM_016047
Figure 2605: DNA325131, XM_005060, gen.XM_005060

Figure 2606: DNA325132, NM_005005, gen.NM_005005
Figure 2607: PRO81704
Figure 2608: DNA325133, XM_037657, gen.XM_037657
Figure 2609: DNA325134, XM_029567, gen.XM_029567
Figure 2610: PRO81705
Figure 2611: DNA325135, XM_088316, gen.XM_088316
Figure 2612: DNA325136, XM_051298, gen.XM_051298
Figure 2613: DNA325137, XM_088370, gen.XM_088370
Figure 2614: DNA325138, NM_016647, gen.NM_016647
Figure 2615: PRO23201
Figure 2616: DNA325139, NM_052963, gen.NM_052963
Figure 2617: PRO81708
Figure 2618: DNA325140, XM_049247, gen.XM_049247
Figure 2619: DNA325141, XM_058968, gen.XM_058968
Figure 2620: DNA325143, NM_023078, gen.NM_023078
Figure 2621: PRO81711
Figure 2622: DNA325144, XM_117487, gen.XM_117487
Figure 2623: DNA325145, XM_049226, gen.XM_049226
Figure 2624: PRO81714
Figure 2625: DNA325146, XM_114613, gen.XM_114613
Figure 2626: DNA325147, XM_035368, gen.XM_035368
Figure 2627: DNA325148, XM_113532, gen.XM_113532
Figure 2628: DNA325149, XM_088321, gen.XM_088321
Figure 2629: DNA325150, XM_035373, gen.XM_035373
Figure 2630: PRO81719
Figure 2631: DNA325151, XM_035370, gen.XM_035370
Figure 2632: PRO81720
Figure 2633: DNA325152, NM_000973, gen.NM_000973
Figure 2634: PRO22907
Figure 2635: DNA325153, NM_033301, gen.NM_033301
Figure 2636: PRO22907
Figure 2637: DNA325154, XM_049421, gen.XM_049421
Figure 2638: DNA325155, XM_034640, gen.XM_034640

Figure 2639: PRO81722
Figure 2640: DNA325156, XM_088550, gen.XM_088550
Figure 2641: DNA325157, XM_088552, gen.XM_088552
Figure 2642: DNA325158, XM_088553, gen.XM_088553
Figure 2643: PRO81725
Figure 2644: DNA325159, XM_059979, gen.XM_059979
Figure 2645: DNA325160, XM_167558, gen.XM_167558
Figure 2646: DNA325161, XM_039654, gen.XM_039654
Figure 2647: DNA325162, XM_060006, gen.XM_060006
Figure 2648: PRO81729
Figure 2649: DNA325163, NM_001122, gen.NM_001122
Figure 2650: PRO81730
Figure 2651: DNA325164, NM_001010, gen.NM_001010
Figure 2652: PRO10824
Figure 2653: DNA325165, NM_058195, gen.NM_058195
Figure 2654: PRO81731
Figure 2655: DNA325166, NM_000077, gen.NM_000077
Figure 2656: PRO36693
Figure 2657: DNA325167, NM_058196, gen.NM_058196
Figure 2658: PRO81732
Figure 2659: DNA325168, XM_017931, gen.XM_017931
Figure 2660: DNA271847, NM_001539, gen.NM_001539
Figure 2661: PRO60127
Figure 2662: DNA270991, NM_004323, gen.NM_004323
Figure 2663: PRO59321
Figure 2664: DNA325169, NM_016410, gen.NM_016410
Figure 2665: PRO81734
Figure 2666: DNA325170, XM_005543, gen.XM_005543
Figure 2667: PRO38028
Figure 2668: DNA325171, NM_001842, gen.NM_001842
Figure 2669: PRO21481
Figure 2670: DNA226345, NM_005866, gen.NM_005866
Figure 2671: PRO36808
Figure 2672: DNA325172, XM_088563, gen.XM_088563
Figure 2673: DNA325173, XM_059998, gen.XM_059998

Figure 2674: PRO59579
Figure 2675: DNA325174, NM_013442,
gen.NM_013442
Figure 2676: PRO9819
Figure 2677: DNA325175, XM_114661,
gen.XM_114661
Figure 2678: PRO81736
Figure 2679: DNA325176, XM_048479,
gen.XM_048479
Figure 2680: DNA290319, NM_003289,
gen.NM_003289
Figure 2681: PRO70595
Figure 2682A-C: DNA325177, NM_006289,
gen.NM_006289
Figure 2683: PRO81738
Figure 2684: DNA325178, XM_048518,
gen.XM_048518
Figure 2685: PRO81739
Figure 2686: DNA325179, XM_048539,
gen.XM_048539
Figure 2687: PRO81740
Figure 2688: DNA325180, XM_114662,
gen.XM_114662
Figure 2689: DNA325181, NM_001833,
gen.NM_001833
Figure 2690: PRO81742
Figure 2691: DNA227491, NM_007096,
gen.NM_007096
Figure 2692: PRO37954
Figure 2693: DNA254771, NM_012203,
gen.NM_012203
Figure 2694: PRO49869
Figure 2695: DNA89242, NM_000700,
gen.NM_000700
Figure 2696: PRO2907
Figure 2697: DNA325182, XM_041020,
gen.XM_041020
Figure 2698: PRO81743
Figure 2699: DNA325183, XM_114686,
gen.XM_114686
Figure 2700: DNA325184, XM_088637,
gen.XM_088637
Figure 2701: DNA287216, NM_021154,
gen.NM_021154
Figure 2702: PRO69496
Figure 2703: DNA288247, NM_058179,
gen.NM_058179
Figure 2704: PRO70011
Figure 2705: DNA325185, XM_071178,
gen.XM_071178
Figure 2706: PRO81746
Figure 2707: DNA325186, XM_005490,
gen.XM_005490
Figure 2708: DNA325187, NM_031263,
gen.NM_031263
Figure 2709: PRO81748

Figure 2710: DNA325188, XM_018006,
gen.XM_018006
Figure 2711: DNA325189, XM_017996,
gen.XM_017996
Figure 2712: DNA325190, XM_016113,
gen.XM_016113
Figure 2713: PRO81751
Figure 2714: DNA272655, NM_001827,
gen.NM_001827
Figure 2715: PRO60781
Figure 2716A-B: DNA325191, NM_002161,
gen.NM_002161
Figure 2717: PRO81752
Figure 2718A-B: DNA325192, NM_013417,
gen.NM_013417
Figure 2719: PRO81753
Figure 2720A-B: DNA325193, XM_046863,
gen.XM_046863
Figure 2721: PRO81754
Figure 2722: DNA325194, XM_046836,
gen.XM_046836
Figure 2723: DNA275322, NM_003837,
gen.NM_003837
Figure 2724: PRO63000
Figure 2725A-B: DNA325195, XM_098943,
gen.XM_098943
Figure 2726: DNA325196, XM_016308,
gen.XM_016308
Figure 2727: DNA325197, XM_005525,
gen.XM_005525
Figure 2728: DNA325198, NM_003389,
gen.NM_003389
Figure 2729: PRO81759
Figure 2730: DNA325199, NM_033219,
gen.NM_033219
Figure 2731: PRO81760
Figure 2732: DNA325200, NM_006401,
gen.NM_006401
Figure 2733: PRO81761
Figure 2734: DNA272213, NM_002486,
gen.NM_002486
Figure 2735: PRO60475
Figure 2736: DNA325201, NM_001333,
gen.NM_001333
Figure 2737: PRO81762
Figure 2738: DNA325202, XM_116818,
gen.XM_116818
Figure 2739: PRO81763
Figure 2740: DNA254543, NM_006808,
gen.NM_006808
Figure 2741: PRO49648
Figure 2742: DNA325203, XM_070873,
gen.XM_070873
Figure 2743: PRO81764
Figure 2744: DNA325204, XM_042788,
gen.XM_042788

Figure 2745: PRO81765
Figure 2746: DNA257309, NM_032342, gen.NM_032342
Figure 2747: PRO51901
Figure 2748: DNA325205, XM_088569, gen.XM_088569
Figure 2749: PRO81766
Figure 2750: DNA325206, XM_088571, gen.XM_088571
Figure 2751: DNA271722, NM_004697, gen.NM_004697
Figure 2752: PRO60006
Figure 2753: DNA325207, NM_017443, gen.NM_017443
Figure 2754: PRO81768
Figure 2755A-C: DNA325208, XM_005348, gen.XM_005348
Figure 2756: DNA325209, XM_114646, gen.XM_114646
Figure 2757: DNA325210, XM_038391, gen.XM_038391
Figure 2758: PRO81771
Figure 2759A-B: DNA325211, XM_045296, gen.XM_045296
Figure 2760: DNA325212, XM_005365, gen.XM_005365
Figure 2761: DNA289530, NM_004435, gen.NM_004435
Figure 2762: PRO70290
Figure 2763: DNA287271, NM_032799, gen.NM_032799
Figure 2764: PRO69542
Figure 2765: DNA325213, XM_026987, gen.XM_026987
Figure 2766: DNA325214, XM_026985, gen.XM_026985
Figure 2767: DNA225630, NM_016174, gen.NM_016174
Figure 2768: PRO36093
Figure 2769: DNA325215, XM_026968, gen.XM_026968
Figure 2770: PRO81775
Figure 2771: DNA325216, XM_026951, gen.XM_026951
Figure 2772: DNA325217, NM_025072, gen.NM_025072
Figure 2773: PRO33818
Figure 2774: DNA325218, XM_033424, gen.XM_033424
Figure 2775: DNA325219, NM_004957, gen.NM_004957
Figure 2776: PRO81778
Figure 2777: DNA325220, XM_033457, gen.XM_033457
Figure 2778A-B: DNA325221, XM_033460, gen.XM_033460

Figure 2779: PRO81780
Figure 2780: DNA325222, NM_000976, gen.NM_000976
Figure 2781: PRO62236
Figure 2782: DNA218841, NM_012098, gen.NM_012098
Figure 2783: PRO34473
Figure 2784A-B: DNA325223, XM_052725, gen.XM_052725
Figure 2785: PRO81781
Figure 2786: DNA325224, XM_011752, gen.XM_011752
Figure 2787: DNA325225, XM_026944, gen.XM_026944
Figure 2788: PRO81783
Figure 2789: DNA325226, XM_116806, gen.XM_116806
Figure 2790A-B: DNA325227, NM_005347, gen.NM_005347
Figure 2791: PRO81785
Figure 2792: DNA325228, NM_005833, gen.NM_005833
Figure 2793: PRO81786
Figure 2794: DNA325229, NM_007209, gen.NM_007209
Figure 2795: PRO61897
Figure 2796: DNA88350, NM_000177, gen.NM_000177
Figure 2797: PRO2758
Figure 2798A-B: DNA325230, XM_011749, gen.XM_011749
Figure 2799: DNA325231, XM_114679, gen.XM_114679
Figure 2800: DNA325232, XM_087041, gen.XM_087041
Figure 2801: DNA325233, XM_114678, gen.XM_114678
Figure 2802: DNA325234, XM_114677, gen.XM_114677
Figure 2803: DNA325235, XM_087038, gen.XM_087038
Figure 2804: DNA325236, XM_059637, gen.XM_059637
Figure 2805: PRO81792
Figure 2806: DNA325237, NM_000368, gen.NM_000368
Figure 2807: PRO60115
Figure 2808: DNA325238, XM_033385, gen.XM_033385
Figure 2809A-B: DNA325239, XM_033380, gen.XM_033380
Figure 2810: PRO81794
Figure 2811: DNA325240, XM_033362, gen.XM_033362
Figure 2812: PRO81795
Figure 2813: DNA325241, XM_059986,

gen.XM_059986
Figure 2814: PRO81796
Figure 2815A-B: DNA325242, XM_033361,
gen.XM_033361
Figure 2816: PRO81797
Figure 2817A-B: DNA325243, XM_033360,
gen.XM_033360
Figure 2818: DNA325244, XM_033359,
gen.XM_033359
Figure 2819A-B: DNA325245, XM_033355,
gen.XM_033355
Figure 2820: DNA325246, NM_014285,
gen.NM_014285
Figure 2821: PRO81800
Figure 2822: DNA325247, NM_054012,
gen.NM_054012
Figure 2823: PRO81801
Figure 2824: DNA325248, XM_035103,
gen.XM_035103
Figure 2825: DNA325249, XM_035109,
gen.XM_035109
Figure 2826: DNA325250, NM_000972,
gen.NM_000972
Figure 2827: PRO81804
Figure 2828: DNA325251, NM_033161,
gen.NM_033161
Figure 2829: PRO81805
Figure 2830: DNA325252, NM_000787,
gen.NM_000787
Figure 2831: PRO81806
Figure 2832A-B: DNA325253, XM_011778,
gen.XM_011778
Figure 2833: DNA325254, XM_088426,
gen.XM_088426
Figure 2834: DNA325255, NM_002003,
gen.NM_002003
Figure 2835: PRO1910
Figure 2836: DNA325256, NM_058199,
gen.NM_058199
Figure 2837: PRO81809
Figure 2838: DNA325257, XM_059945,
gen.XM_059945
Figure 2839: DNA325258, XM_088422,
gen.XM_088422
Figure 2840: PRO81811
Figure 2841: DNA325259, XM_029168,
gen.XM_029168
Figure 2842: PRO81812
Figure 2843: DNA325260, XM_098913,
gen.XM_098913
Figure 2844: PRO81813
Figure 2845: DNA325261, XM_114669,
gen.XM_114669
Figure 2846: DNA325262, XM_113564,
gen.XM_113564
Figure 2847A-B: DNA325263, XM_088459,

gen.XM_088459
Figure 2848: PRO81815
Figure 2849: DNA325264, XM_054752,
gen.XM_054752
Figure 2850: PRO81816
Figure 2851: DNA325265, XM_084270,
gen.XM_084270
Figure 2852: DNA325266, XM_054763,
gen.XM_054763
Figure 2853: PRO81817
Figure 2854: DNA325267, XM_114655,
gen.XM_114655
Figure 2855: DNA325268, XM_038030,
gen.XM_038030
Figure 2856: PRO59351
Figure 2857: DNA325269, XM_072526,
gen.XM_072526
Figure 2858: PRO81819
Figure 2859: DNA325270, XM_059961,
gen.XM_059961
Figure 2860: DNA325271, NM_032928,
gen.NM_032928
Figure 2861: PRO81821
Figure 2862: DNA325272, NM_014172,
gen.NM_014172
Figure 2863: PRO81822
Figure 2864: DNA325273, XM_038049,
gen.XM_038049
Figure 2865: PRO62069
Figure 2866: DNA325274, XM_038063,
gen.XM_038063
Figure 2867: PRO81823
Figure 2868: DNA325275, NM_000954,
gen.NM_000954
Figure 2869: PRO81824
Figure 2870: DNA325276, XM_088461,
gen.XM_088461
Figure 2871: DNA325277, XM_059966,
gen.XM_059966
Figure 2872: PRO81826
Figure 2873: DNA325278, XM_114649,
gen.XM_114649
Figure 2874: DNA325279, XM_117519,
gen.XM_117519
Figure 2875: DNA325280, XM_053206,
gen.XM_053206
Figure 2876: DNA325281, XM_040272,
gen.XM_040272
Figure 2877: PRO58939
Figure 2878: DNA325282, XM_005724,
gen.XM_005724
Figure 2879: DNA325283, XM_040267,
gen.XM_040267
Figure 2880: PRO81831
Figure 2881: DNA325284, XM_048859,
gen.XM_048859

50

Figure 2951: DNA287642, NM_018464, gen.NM_018464
Figure 2952: PRO9902
Figure 2953: DNA325326, XM_084451, gen.XM_084451
Figure 2954: PRO81869
Figure 2955: DNA325327, NM_012207, gen.NM_012207
Figure 2956: PRO81870
Figure 2957: DNA325328, NM_024045, gen.NM_024045
Figure 2958: PRO81871
Figure 2959: DNA325329, NM_004728, gen.NM_004728
Figure 2960: PRO81872
Figure 2961: DNA88562, NM_002727, gen.NM_002727
Figure 2962: PRO2842
Figure 2963: DNA325330, XM_167395, gen.XM_167395
Figure 2964: DNA227172, NM_021129, gen.NM_021129
Figure 2965: PRO37635
Figure 2966A-B: DNA325331, XM_166125, gen.XM_166125
Figure 2967: PRO81874
Figure 2968: DNA325332, XM_044354, gen.XM_044354
Figure 2969: PRO81875
Figure 2970: DNA325333, XM_032520, gen.XM_032520
Figure 2971: DNA325334, NM_019058, gen.NM_019058
Figure 2972: PRO81877
Figure 2973: DNA325335, XM_045140, gen.XM_045140
Figure 2974: PRO2875
Figure 2975: DNA325336, XM_116863, gen.XM_116863
Figure 2976: DNA325337, XM_032476, gen.XM_032476
Figure 2977: DNA325338, XM_114894, gen.XM_114894
Figure 2978: DNA325339, NM_033022, gen.NM_033022
Figure 2979: PRO81881
Figure 2980: DNA325340, NM_001026, gen.NM_001026
Figure 2981: PRO11139
Figure 2982: DNA103421, NM_003375, gen.NM_003375
Figure 2983: PRO4749
Figure 2984A-B: DNA325341, XM_166093, gen.XM_166093
Figure 2985: PRO81882
Figure 2986: DNA304459, NM_005729,

gen.NM_005729
Figure 2987: PRO37073
Figure 2988: DNA325342, XM_166629, gen.XM_166629
Figure 2989: PRO81883
Figure 2990: DNA103506, NM_001157, gen.NM_001157
Figure 2991: PRO4833
Figure 2992: DNA325343, XM_016093, gen.XM_016093
Figure 2993: PRO81884
Figure 2994: DNA325344, XM_084467, gen.XM_084467
Figure 2995: PRO81885
Figure 2996: DNA304488, NM_032333, gen.NM_032333
Figure 2997: PRO71057
Figure 2998: DNA325345, XM_043589, gen.XM_043589
Figure 2999: DNA325346, XM_043605, gen.XM_043605
Figure 3000: DNA325347, XM_087480, gen.XM_087480
Figure 3001: PRO81887
Figure 3002: DNA325348, NM_002921, gen.NM_002921
Figure 3003: PRO81888
Figure 3004: DNA226217, NM_005271, gen.NM_005271
Figure 3005: PRO36680
Figure 3006: DNA325349, XM_089551, gen.XM_089551
Figure 3007: PRO81889
Figure 3008: DNA287237, NM_001613, gen.NM_001613
Figure 3009: PRO39648
Figure 3010: DNA325350, XM_084477, gen.XM_084477
Figure 3011: PRO69523
Figure 3012: DNA325351, XM_084480, gen.XM_084480
Figure 3013A-B: DNA325352, NM_013451, gen.NM_013451
Figure 3014: PRO12813
Figure 3015: DNA325353, XM_018167, gen.XM_018167
Figure 3016: DNA325354, XM_084372, gen.XM_084372
Figure 3017: DNA325355, NM_020992, gen.NM_020992
Figure 3018: PRO81893
Figure 3019: DNA325356, XM_089514, gen.XM_089514
Figure 3020A-B: DNA325357, XM_058343, gen.XM_058343
Figure 3021: PRO81895

Figure 3022: DNA325358, XM_058602, gen.XM_058602
Figure 3023: PRO81896
Figure 3024A-B: DNA325359, NM_015179, gen.NM_015179
Figure 3025: PRO81897
Figure 3026: DNA325360, XM_083842, gen.XM_083842
Figure 3027: PRO69473
Figure 3028: DNA325361, XM_084413, gen.XM_084413
Figure 3029: DNA325362, NM_022362, gen.NM_022362
Figure 3030: PRO81899
Figure 3031: DNA325363, NM_032112, gen.NM_032112
Figure 3032: PRO81900
Figure 3033: DNA325364, NM_021830, gen.NM_021830
Figure 3034: PRO81901
Figure 3035A-B: DNA325365, XM_046743, gen.XM_046743
Figure 3036: PRO81902
Figure 3037: DNA325366, NM_013274, gen.NM_013274
Figure 3038: PRO81903
Figure 3039: DNA325367, NM_022039, gen.NM_022039
Figure 3040: PRO81904
Figure 3041A-B: DNA325368, XM_031866, gen.XM_031866
Figure 3042A-B: DNA325369, NM_015062, gen.NM_015062
Figure 3043: PRO81905
Figure 3044A-B: DNA325370, XM_031890, gen.XM_031890
Figure 3045A-B: DNA325371, NM_004193, gen.NM_004193
Figure 3046: PRO81907
Figure 3047: DNA325372, NM_024040, gen.NM_024040
Figure 3048: PRO81908
Figure 3049: DNA325373, XM_031949, gen.XM_031949
Figure 3050: PRO4900
Figure 3051A-B: DNA144601, NM_016169, gen.NM_016169
Figure 3052: PRO34073
Figure 3053: DNA325374, XM_005698, gen.XM_005698
Figure 3054: PRO81909
Figure 3055: DNA325375, NM_006523, gen.NM_006523
Figure 3056: PRO59043
Figure 3057: DNA325376, XM_018279, gen.XM_018279

Figure 3058A-B: DNA325377, XM_005938, gen.XM_005938
Figure 3059A-B: DNA325378, XM_031992, gen.XM_031992
Figure 3060: PRO81912
Figure 3061: DNA325379, NM_032747, gen.NM_032747
Figure 3062: PRO81913
Figure 3063: DNA325380, NM_005004, gen.NM_005004
Figure 3064: PRO81914
Figure 3065: DNA325381, XM_030447, gen.XM_030447
Figure 3066: DNA273521, NM_002079, gen.NM_002079
Figure 3067: PRO61502
Figure 3068A-B: DNA325382, NM_032211, gen.NM_032211
Figure 3069: PRO81916
Figure 3070: DNA325383, NM_031484, gen.NM_031484
Figure 3071: PRO81917
Figure 3072: DNA325384, XM_084632, gen.XM_084632
Figure 3073: DNA325385, XM_084359, gen.XM_084359
Figure 3074A-D: DNA325386, XM_045667, gen.XM_045667
Figure 3075: DNA325387, XM_109162, gen.XM_109162
Figure 3076: DNA227509, NM_000274, gen.NM_000274
Figure 3077: PRO37972
Figure 3078: DNA325388, XM_058361, gen.XM_058361
Figure 3079: PRO81922
Figure 3080: DNA325389, XM_084505, gen.XM_084505
Figure 3081: PRO81923
Figure 3082A-B: DNA325390, XM_049795, gen.XM_049795
Figure 3083: PRO81924
Figure 3084: DNA325391, XM_058406, gen.XM_058406
Figure 3085: PRO81925
Figure 3086: DNA325392, XM_055573, gen.XM_055573
Figure 3087: PRO60991
Figure 3088: DNA325393, XM_005969, gen.XM_005969
Figure 3089: DNA325394, NM_007190, gen.NM_007190
Figure 3090: PRO81926
Figure 3091: DNA325395, NM_000982, gen.NM_000982
Figure 3092: PRO81927

Figure 3093: DNA269952, NM_004725, gen.NM_004725
Figure 3094: PRO58348
Figure 3095: DNA325396, NM_024942, gen.NM_024942
Figure 3096: PRO81928
Figure 3097: DNA325397, NM_016567, gen.NM_016567
Figure 3098: PRO81929
Figure 3099: DNA325398, NM_004092, gen.NM_004092
Figure 3100: PRO81930
Figure 3101: DNA269431, NM_006659, gen.NM_006659
Figure 3102: PRO57854
Figure 3103: DNA325399, XM_005675, gen.XM_005675
Figure 3104: DNA325400, XM_114862, gen.XM_114862
Figure 3105: PRO81932
Figure 3106: DNA325401, XM_088009, gen.XM_088009
Figure 3107: DNA325402, NM_016526, gen.NM_016526
Figure 3108: PRO81934
Figure 3109: DNA255696, NM_021932, gen.NM_021932
Figure 3110: PRO50756
Figure 3111: DNA325403, XM_043220, gen.XM_043220
Figure 3112: PRO81935
Figure 3113: DNA255078, NM_006435, gen.NM_006435
Figure 3114: PRO50165
Figure 3115: DNA325404, NM_002339, gen.NM_002339
Figure 3116: PRO81936
Figure 3117: DNA325405, XM_028192, gen.XM_028192
Figure 3118: PRO81937
Figure 3119: DNA325406, XM_096544, gen.XM_096544
Figure 3120: DNA325407, NM_000612, gen.NM_000612
Figure 3121: PRO124
Figure 3122: DNA325408, XM_084742, gen.XM_084742
Figure 3123: PRO81939
Figure 3124: DNA325409, XM_084739, gen.XM_084739
Figure 3125: DNA325410, XM_058505, gen.XM_058505
Figure 3126: PRO81941
Figure 3127: DNA325411, XM_006139, gen.XM_006139
Figure 3128: PRO81942

Figure 3129: DNA325412, XM_044932, gen.XM_044932
Figure 3130: PRO81943
Figure 3131A-B: DNA325413, XM_044957, gen.XM_044957
Figure 3132: PRO81944
Figure 3133: DNA325414, NM_001909, gen.NM_001909
Figure 3134: PRO292
Figure 3135: DNA325415, XM_006475, gen.XM_006475
Figure 3136: DNA325416, XM_006483, gen.XM_006483
Figure 3137: DNA325417, NM_001751, gen.NM_001751
Figure 3138: PRO69635
Figure 3139: DNA325418, XM_114981, gen.XM_114981
Figure 3140: PRO81945
Figure 3141: DNA325419, XM_083852, gen.XM_083852
Figure 3142: DNA325420, NM_000559, gen.NM_000559
Figure 3143: PRO81946
Figure 3144: DNA325421, NM_000184, gen.NM_000184
Figure 3145: PRO81947
Figure 3146: DNA325422, NM_005330, gen.NM_005330
Figure 3147: PRO81948
Figure 3148: DNA325423, XM_015243, gen.XM_015243
Figure 3149: DNA325424, NM_015324, gen.NM_015324
Figure 3150: PRO81950
Figure 3151: DNA325425, XM_006424, gen.XM_006424
Figure 3152: DNA325426, XM_113238, gen.XM_113238
Figure 3153A-C: DNA325427, XM_052786, gen.XM_052786
Figure 3154: PRO81953
Figure 3155: DNA325428, NM_000990, gen.NM_000990
Figure 3156: PRO25985
Figure 3157A-B: DNA325429, XM_045750, gen.XM_045750
Figure 3158: PRO81954
Figure 3159: DNA325430, XM_058414, gen.XM_058414
Figure 3160: PRO81955
Figure 3161A-B: DNA325431, XM_049197, gen.XM_049197
Figure 3162: PRO81956
Figure 3163A-B: DNA325432, NM_001418, gen.NM_001418

gen.NM_014610
Figure 3233: PRO81992
Figure 3234: DNA325470, XM_167747,
gen.XM_167747
Figure 3235: PRO81993
Figure 3236: DNA287254, NM_024099,
gen.NM_024099
Figure 3237: PRO69528
Figure 3238: DNA325471, NM_015853,
gen.NM_015853
Figure 3239: PRO81994
Figure 3240: DNA325472, NM_032667,
gen.NM_032667
Figure 3241: PRO81995
Figure 3242: DNA325473, NM_006362,
gen.NM_006362
Figure 3243: PRO81996
Figure 3244: DNA325474, XM_167716,
gen.XM_167716
Figure 3245: DNA75863, NM_002411,
gen.NM_002411
Figure 3246: PRO2018
Figure 3247: DNA325475, XM_087710,
gen.XM_087710
Figure 3248: DNA325476, XM_167726,
gen.XM_167726
Figure 3249: DNA325477, NM_004265,
gen.NM_004265
Figure 3250: PRO12878
Figure 3251A-B: DNA325478, NM_013402,
gen.NM_013402
Figure 3252: PRO81999
Figure 3253: DNA325479, NM_004111,
gen.NM_004111
Figure 3254: PRO69568
Figure 3255: DNA325480, XM_048286,
gen.XM_048286
Figure 3256: DNA325481, NM_004322,
gen.NM_004322
Figure 3257: PRO20117
Figure 3258: DNA325482, NM_032989,
gen.NM_032989
Figure 3259: PRO20117
Figure 3260: DNA325483, XM_011988,
gen.XM_011988
Figure 3261: DNA325484, NM_031472,
gen.NM_031472
Figure 3262: PRO82002
Figure 3263: DNA325485, XM_037808,
gen.XM_037808
Figure 3264: DNA325486, NM_004074,
gen.NM_004074
Figure 3265: PRO82004
Figure 3266: DNA325487, NM_017670,
gen.NM_017670
Figure 3267: PRO82005

Figure 3268: DNA325488, XM_113223,
gen.XM_113223
Figure 3269: DNA325489, XM_045642,
gen.XM_045642
Figure 3270: DNA325490, XM_006533,
gen.XM_006533
Figure 3271: DNA325491, XM_045613,
gen.XM_045613
Figure 3272: PRO59721
Figure 3273A-B: DNA325492, XM_045612,
gen.XM_045612
Figure 3274: PRO82009
Figure 3275: DNA325493, XM_113224,
gen.XM_113224
Figure 3276: DNA325494, XM_045499,
gen.XM_045499
Figure 3277: PRO82011
Figure 3278: DNA325495, XM_045525,
gen.XM_045525
Figure 3279: DNA325496, NM_013265,
gen.NM_013265
Figure 3280: PRO82013
Figure 3281: DNA325497, XM_006529,
gen.XM_006529
Figure 3282: PRO60008
Figure 3283: DNA325498, XM_053787,
gen.XM_053787
Figure 3284: DNA269803, NM_001667,
gen.NM_001667
Figure 3285: PRO58207
Figure 3286: DNA325499, XM_115031,
gen.XM_115031
Figure 3287: DNA325500, XM_084702,
gen.XM_084702
Figure 3288: DNA325501, XM_053796,
gen.XM_053796
Figure 3289: DNA325502, NM_002689,
gen.NM_002689
Figure 3290: PRO82018
Figure 3291A-D: DNA325503, XM_167804,
gen.XM_167804
Figure 3292: PRO82019
Figure 3293: DNA325504, XM_166235,
gen.XM_166235
Figure 3294: DNA325505, XM_166236,
gen.XM_166236
Figure 3295: DNA270721, NM_006842,
gen.NM_006842
Figure 3296: PRO59084
Figure 3297: DNA189687, NM_000852,
gen.NM_000852
Figure 3298: PRO25845
Figure 3299: DNA325506, NM_007103,
gen.NM_007103
Figure 3300: PRO58606
Figure 3301: DNA325507, NM_005851,

gen.NM_005851
Figure 3302: PRO69461
Figure 3303A-B: DNA325508, XM_165598, gen.XM_165598
Figure 3304: DNA325509, NM_006019, gen.NM_006019
Figure 3305: PRO82023
Figure 3306: DNA325510, NM_006053, gen.NM_006053
Figure 3307: PRO24831
Figure 3308: DNA325511, XM_166196, gen.XM_166196
Figure 3309: PRO82024
Figure 3310: DNA325512, XM_165600, gen.XM_165600
Figure 3311A-B: DNA325513, NM_053056, gen.NM_053056
Figure 3312: PRO4870
Figure 3313: DNA103474, NM_003824, gen.NM_003824
Figure 3314: PRO4801
Figure 3315: DNA325514, XM_096486, gen.XM_096486
Figure 3316A-B: DNA325515, NM_003626, gen.NM_003626
Figure 3317: PRO82027
Figure 3318A-B: DNA325516, XM_167853, gen.XM_167853
Figure 3319: PRO82028
Figure 3320: DNA325517, NM_014042, gen.NM_014042
Figure 3321: PRO82029
Figure 3322A-B: DNA325518, NM_001567, gen.NM_001567
Figure 3323: PRO61238
Figure 3324: DNA325519, XM_167433, gen.XM_167433
Figure 3325: DNA325520, XM_165616, gen.XM_165616
Figure 3326: DNA325521, NM_032871, gen.NM_032871
Figure 3327: PRO57307
Figure 3328: DNA325522, XM_165631, gen.XM_165631
Figure 3329: DNA254186, NM_014752, gen.NM_014752
Figure 3330: PRO49298
Figure 3331: DNA325523, NM_001005, gen.NM_001005
Figure 3332: PRO82032
Figure 3333: DNA88176, NM_001235, gen.NM_001235
Figure 3334: PRO2685
Figure 3335A-B: DNA325524, XM_165627, gen.XM_165627
Figure 3336: DNA325525, XM_166253,

gen.XM_166253
Figure 3337: DNA325526, NM_001293, gen.NM_001293
Figure 3338: PRO82034
Figure 3339: DNA325527, XM_042852, gen.XM_042852
Figure 3340: PRO82035
Figure 3341: DNA325528, XM_165628, gen.XM_165628
Figure 3342A-B: DNA325529, NM_080491, gen.NM_080491
Figure 3343: PRO82037
Figure 3344A-B: DNA325530, NM_012296, gen.NM_012296
Figure 3345: PRO60311
Figure 3346: DNA325531, NM_032379, gen.NM_032379
Figure 3347: PRO82038
Figure 3348: DNA325532, NM_007173, gen.NM_007173
Figure 3349: DNA325533, XM_166239, gen.XM_166239
Figure 3350: DNA325534, XM_084610, gen.XM_084610
Figure 3351: PRO82040
Figure 3352: DNA325535, XM_058450, gen.XM_058450
Figure 3353: DNA325536, XM_084601, gen.XM_084601
Figure 3354: PRO82042
Figure 3355A-B: DNA325537, XM_006464, gen.XM_006464
Figure 3356: PRO82043
Figure 3357: DNA325538, XM_084570, gen.XM_084570
Figure 3358: DNA325539, XM_051435, gen.XM_051435
Figure 3359: DNA325540, NM_001467, gen.NM_001467.
Figure 3360: PRO82045
Figure 3361: DNA325541, NM_001028, gen.NM_001028
Figure 3362: PRO82046
Figure 3363: DNA325542, XM_113230, gen.XM_113230
Figure 3364: DNA325543, XM_115062, gen.XM_115062
Figure 3365: DNA325544, XM_115063, gen.XM_115063
Figure 3366: DNA325545, XM_113229, gen.XM_113229
Figure 3367A-B: DNA325546, XM_051489, gen.XM_051489
Figure 3368: PRO82050
Figure 3369: DNA325547, NM_022003, gen.NM_022003

Figure 3370: PRO82051
Figure 3371: DNA325548, XM_006432, gen.XM_006432
Figure 3372: PRO82052
Figure 3373: DNA325549, XM_051716, gen.XM_051716
Figure 3374: DNA325550, NM_025164, gen.NM_025164
Figure 3375: PRO82054
Figure 3376: DNA225752, NM_000039, gen.NM_000039
Figure 3377: PRO36215
Figure 3378: DNA325551, XM_052113, gen.XM_052113
Figure 3379: PRO82055
Figure 3380: DNA271324, NM_006169, gen.NM_006169
Figure 3381: PRO59629
Figure 3382: DNA325552, XM_084658, gen.XM_084658
Figure 3383: PRO82056
Figure 3384: DNA325553, NM_000795, gen.NM_000795
Figure 3385: PRO12448
Figure 3386: DNA325554, NM_017868, gen.NM_017868
Figure 3387: PRO82057
Figure 3388: DNA325555, XM_084654, gen.XM_084654
Figure 3389: PRO82058
Figure 3390: DNA272413, NM_003002, gen.NM_003002
Figure 3391: PRO60666
Figure 3392: DNA271843, NM_004398, gen.NM_004398
Figure 3393: PRO60123
Figure 3394: DNA325556, XM_017369, gen.XM_017369
Figure 3395: DNA325557, NM_032299, gen.NM_032299
Figure 3396: PRO82060
Figure 3397: DNA325558, XM_055369, gen.XM_055369
Figure 3398: DNA325559, XM_051430, gen.XM_051430
Figure 3399: DNA325560, XM_006467, gen.XM_006467
Figure 3400: DNA325561, XM_113226, gen.XM_113226
Figure 3401: DNA325562, XM_165592, gen.XM_165592
Figure 3402: PRO82064
Figure 3403: DNA325563, XM_166181, gen.XM_166181
Figure 3404: DNA325564, XM_052862, gen.XM_052862

Figure 3405: PRO82066
Figure 3406: DNA325565, XM_166177, gen.XM_166177
Figure 3407: DNA325566, XM_165571, gen.XM_165571
Figure 3408: PRO82068
Figure 3409: DNA325567, XM_166174, gen.XM_166174
Figure 3410: PRO82069
Figure 3411: DNA325568, NM_001274, gen.NM_001274
Figure 3412: PRO12187
Figure 3413: DNA325569, XM_165586, gen.XM_165586
Figure 3414: DNA325570, XM_165584, gen.XM_165584
Figure 3415: DNA257965, NM_032873, gen.NM_032873
Figure 3416: PRO52492
Figure 3417: DNA325571, XM_167780, gen.XM_167780
Figure 3418: DNA325572, XM_166743, gen.XM_166743
Figure 3419: PRO82072
Figure 3420: DNA325573, NM_012101, gen.NM_012101
Figure 3421: PRO82073
Figure 3422: DNA325574, NM_058193, gen.NM_058193
Figure 3423: PRO82074
Figure 3424: DNA325575, XM_084522, gen.XM_084522
Figure 3425: PRO82075
Figure 3426: DNA325576, XM_091786, gen.XM_091786
Figure 3427: DNA325577, XM_165390, gen.XM_165390
Figure 3428: DNA325578, XM_084525, gen.XM_084525
Figure 3429A-B: DNA325579, XM_010494, gen.XM_010494
Figure 3430A-B: DNA325580, NM_015064, gen.NM_015064
Figure 3431: PRO82078
Figure 3432: DNA325581, NM_030775, gen.NM_030775
Figure 3433: PRO71031
Figure 3434: DNA297398, NM_032642, gen.NM_032642
Figure 3435: PRO71031
Figure 3436: DNA325582, XM_017080, gen.XM_017080
Figure 3437: DNA325583, XM_113739, gen.XM_113739
Figure 3438: PRO82080
Figure 3439: DNA325584, NM_002014,

59

Figure 3508: PRO82109
Figure 3509: DNA325619, NM_005889, gen.NM_005889
Figure 3510: PRO82110
Figure 3511: DNA256072, NM_001644, gen.NM_001644
Figure 3512: PRO51121
Figure 3513: DNA325620, NM_018686, gen.NM_018686
Figure 3514: PRO82111
Figure 3515: DNA325621, XM_084770, gen.XM_084770,
Figure 3516: PRO82112
Figure 3517: DNA325622, NM_018048, gen.NM_018048
Figure 3518: PRO82113
Figure 3519: DNA325623, XM_113730, gen.XM_113730
Figure 3520: DNA150978, NM_007244, gen.NM_007244
Figure 3521: PRO11601
Figure 3522: DNA325624, NM_006250, gen.NM_006250
Figure 3523: PRO82115
Figure 3524: DNA79313, NM_005042, gen.NM_005042
Figure 3525: PRO2555
Figure 3526: DNA150997, NM_004982, gen.NM_004982
Figure 3527: PRO12573
Figure 3528: DNA325625, XM_050074, gen.XM_050074
Figure 3529: DNA325626, NM_024854, gen.NM_024854
Figure 3530: PRO82117
Figure 3531: DNA325627, XM_084807, gen.XM_084807
Figure 3532: DNA325628, XM_165906, gen.XM_165906
Figure 3533A-B: DNA325629, XM_038659, gen.XM_038659
Figure 3534: PRO82120
Figure 3535: DNA325630, XM_006694, gen.XM_006694
Figure 3536: DNA325631, XM_006748, gen.XM_006748
Figure 3537: PRO82122
Figure 3538: DNA325632, XM_016640, gen.XM_016640
Figure 3539: DNA325633, XM_096146, gen.XM_096146
Figure 3540A-B: DNA325634, XM_084841, gen.XM_084841
Figure 3541: PRO82125
Figure 3542: DNA325635, XM_090218, gen.XM_090218

Figure 3543: DNA325636, XM_012272, gen.XM_012272
Figure 3544: PRO82127
Figure 3545A-B: DNA325637, XM_056481, gen.XM_056481
Figure 3546: DNA325638, NM_006262, gen.NM_006262
Figure 3547: PRO82129
Figure 3548: DNA325639, NM_018113, gen.NM_018113
Figure 3549: PRO82130
Figure 3550: DNA271344, NM_001659, gen.NM_001659
Figure 3551: PRO59647
Figure 3552: DNA325640, NM_017822, gen.NM_017822
Figure 3553: PRO82131
Figure 3554A-E: DNA325641, XM_028760, gen.XM_028760
Figure 3555: DNA272379, NM_002733, gen.NM_002733
Figure 3556: PRO60634
Figure 3557: DNA325642, XM_084866, gen.XM_084866
Figure 3558: PRO82133
Figure 3559: DNA325643, XM_006826, gen.XM_006826
Figure 3560: DNA325644, XM_113719, gen.XM_113719
Figure 3561: DNA325645, XM_028662, gen.XM_028662
Figure 3562: DNA325646, XM_035497, gen.XM_035497
Figure 3563: PRO82137
Figure 3564: DNA325647, XM_035490, gen.XM_035490
Figure 3565: PRO82138
Figure 3566: DNA325648, NM_013277, gen.NM_013277
Figure 3567: PRO82139
Figure 3568: DNA325649, NM_003076, gen.NM_003076
Figure 3569: PRO82140
Figure 3570: DNA325650, XM_115117, gen.XM_115117
Figure 3571: DNA325651, XM_035485, gen.XM_035485
Figure 3572A-B: DNA325652, NM_016357, gen.NM_016357
Figure 3573: PRO82143
Figure 3574: DNA325653, NM_005171, gen.NM_005171
Figure 3575: PRO60924
Figure 3576: DNA325654, NM_014033, gen.NM_014033
Figure 3577: PRO4348

Figure 3578: DNA325655, XM_096620,
gen.XM_096620
Figure 3579: DNA325656, XM_165905,
gen.XM_165905
Figure 3580: DNA325657, XM_015481,
gen.XM_015481
Figure 3581: DNA325658, XM_049148,
gen.XM_049148
Figure 3582: DNA325659, XM_084885,
gen.XM_084885
Figure 3583: DNA325660, XM_084884,
gen.XM_084884
Figure 3584: DNA325661, XM_113726,
gen.XM_113726
Figure 3585: DNA325662, XM_015476,
gen.XM_015476
Figure 3586: DNA325663, XM_049141,
gen.XM_049141
Figure 3587: PRO82152
Figure 3588: DNA227191, NM_021934,
gen.NM_021934
Figure 3589: PRO37654
Figure 3590: DNA325664, XM_083868,
gen.XM_083868
Figure 3591: DNA270458, NM_002273,
gen.NM_002273
Figure 3592: PRO58837
Figure 3593: DNA227092, NM_000224,
gen.NM_000224
Figure 3594: PRO37555
Figure 3595: DNA325665, XM_029728,
gen.XM_029728
Figure 3596: DNA325666, XM_015468,
gen.XM_015468
Figure 3597: PRO82155
Figure 3598: DNA325667, XM_012162,
gen.XM_012162
Figure 3599: DNA325668, XM_084789,
gen.XM_084789
Figure 3600: DNA196351, NM_002178,
gen.NM_002178
Figure 3601: PRO3449
Figure 3602A-B: DNA325669, XM_029631,
gen.XM_029631
Figure 3603: PRO82158
Figure 3604: DNA325670, NM_015665,
gen.NM_015665
Figure 3605: PRO82159
Figure 3606: DNA325671, NM_014311,
gen.NM_014311
Figure 3607: PRO82160
Figure 3608: DNA325672, XM_096606,
gen.XM_096606
Figure 3609: PRO82161
Figure 3610: DNA325673, NM_018457,
gen.NM_018457

Figure 3611: PRO82162
Figure 3612: DNA325674, NM_031157,
gen.NM_031157
Figure 3613: PRO82163
Figure 3614: DNA325675, NM_004178,
gen.NM_004178
Figure 3615: PRO82164
Figure 3616: DNA325676, NM_134323,
gen.NM_134323
Figure 3617: PRO82165
Figure 3618: DNA325677, NM_134324,
gen.NM_134324
Figure 3619: PRO82166
Figure 3620: DNA290294, NM_005016,
gen.NM_005016
Figure 3621: PRO70453
Figure 3622: DNA325678, NM_031989,
gen.NM_031989
Figure 3623: PRO82167
Figure 3624: DNA325679, XM_028643,
gen.XM_028643
Figure 3625: PRO82168
Figure 3626: DNA325680, XM_006710,
gen.XM_006710
Figure 3627: PRO82169
Figure 3628: DNA227094, NM_005594,
gen.NM_005594
Figure 3629: PRO37557
Figure 3630: DNA325681, XM_084824,
gen.XM_084824
Figure 3631: DNA304783, NM_014255,
gen.NM_014255
Figure 3632: PRO4426
Figure 3633: DNA325682, XM_165903,
gen.XM_165903
Figure 3634: DNA325683, XM_115140,
gen.XM_115140
Figure 3635: DNA325684, XM_113712,
gen.XM_113712
Figure 3636: DNA325685, NM_006601,
gen.NM_006601
Figure 3637: PRO82174
Figure 3638: DNA325686, XM_012182,
gen.XM_012182
Figure 3639: PRO82175
Figure 3640: DNA325687, XM_048943,
gen.XM_048943
Figure 3641: DNA325688, XM_053164,
gen.XM_053164
Figure 3642: DNA325689, XM_048991,
gen.XM_048991
Figure 3643: DNA325690, NM_024068,
gen.NM_024068
Figure 3644: PRO82179
Figure 3645A-B: DNA325691, XM_056346,
gen.XM_056346

Figure 3646: DNA325692, NM_021019,
gen.NM_021019
Figure 3647: PRO82181
Figure 3648: DNA325693, NM_079423,
gen.NM_079423
Figure 3649: PRO82182
Figure 3650: DNA325694, NM_079425,
gen.NM_079425
Figure 3651: PRO82183
Figure 3652: DNA325695, XM_049048,
gen.XM_049048
Figure 3653: PRO82184
Figure 3654: DNA325696, NM_021104,
gen.NM_021104
Figure 3655: PRO11213
Figure 3656: DNA325697, NM_001029,
gen.NM_001029
Figure 3657: PRO10838
Figure 3658: DNA325698, XM_001482,
gen.XM_001482
Figure 3659: DNA325699, XM_049150,
gen.XM_049150
Figure 3660: DNA325700, NM_006928,
gen.NM_006928
Figure 3661: PRO2846
Figure 3662: DNA325701, XM_056353,
gen.XM_056353
Figure 3663: DNA325702, NM_001780,
gen.NM_001780
Figure 3664: PRO283
Figure 3665: DNA325703, NM_031479,
gen.NM_031479
Figure 3666: PRO21773
Figure 3667A-: DNA137231, NM_005269,
gen.NM_005269
Figure 3668: PRO9112
Figure 3669: DNA325704, NM_004990,
gen.NM_004990
Figure 3670: PRO82188
Figure 3671: DNA325705, XM_058528,
gen.XM_058528
Figure 3672: DNA325706, XM_084801,
gen.XM_084801
Figure 3673: PRO82190
Figure 3674: DNA325707, XM_048603,
gen.XM_048603
Figure 3675: PRO82191
Figure 3676: DNA325708, NM_133483,
gen.NM_133483
Figure 3677: PRO82192
Figure 3678: DNA79101, NM_006812,
gen.NM_006812
Figure 3679: PRO2549
Figure 3680: DNA325709, XM_096566,
gen.XM_096566
Figure 3681: DNA325710, NM_005981,

gen.NM_005981
Figure 3682: PRO4666
Figure 3683: DNA325711, NM_000075,
gen.NM_000075
Figure 3684: PRO4873
Figure 3685: DNA325712, NM_052984,
gen.NM_052984
Figure 3686: PRO82194
Figure 3687: DNA325713, NM_000785,
gen.NM_000785
Figure 3688: PRO58440
Figure 3689: DNA325714, NM_005371,
gen.NM_005371
Figure 3690: PRO82195
Figure 3691: DNA325715, NM_023032,
gen.NM_023032
Figure 3692: PRO82196
Figure 3693: DNA325716, NM_023033,
gen.NM_023033
Figure 3694: PRO82197
Figure 3695: DNA325717, NM_005726,
gen.NM_005726
Figure 3696: PRO82198
Figure 3697: DNA325718, NM_006576,
gen.NM_006576
Figure 3698: PRO82199
Figure 3699A-B: DNA325719, XM_096038,
gen.XM_096038
Figure 3700: DNA325720, XM_056681,
gen.XM_056681
Figure 3701: PRO82201
Figure 3702: DNA325721, XM_084909,
gen.XM_084909
Figure 3703: PRO82202
Figure 3704: DNA325722, XM_004098,
gen.XM_004098
Figure 3705: DNA325723, XM_084912,
gen.XM_084912
Figure 3706: PRO82204
Figure 3707: DNA325724, XM_040221,
gen.XM_040221
Figure 3708: DNA325725, XM_016605,
gen.XM_016605
Figure 3709: PRO82206
Figure 3710: DNA325726, XM_017508,
gen.XM_017508
Figure 3711: PRO82207
Figure 3712: DNA325727, NM_032338,
gen.NM_032338
Figure 3713: PRO82208
Figure 3714A-B: DNA325728, XM_052460,
gen.XM_052460
Figure 3715: DNA325729, XM_083866,
gen.XM_083866
Figure 3716: PRO82210
Figure 3717: DNA304694, NM_020401,

Figure 3788A-B: DNA325766, XM_084941, gen.XM_084941
Figure 3789: PRO82237
Figure 3790A-B: DNA325767, NM_057169, gen.NM_057169
Figure 3791: PRO82238
Figure 3792A-B: DNA325768, NM_014776, gen.NM_014776
Figure 3793: PRO82239
Figure 3794: DNA325769, NM_032904, gen.NM_032904
Figure 3795: PRO82240
Figure 3796A-B: DNA325770, XM_007003, gen.XM_007003
Figure 3797: DNA325771, XM_007002, gen.XM_007002
Figure 3798: DNA325772, XM_056996, gen.XM_056996
Figure 3799: PRO82243
Figure 3800: DNA325773, XM_084946, gen.XM_084946
Figure 3801: PRO82244
Figure 3802: DNA325775, XM_027102, gen.XM_027102
Figure 3803: PRO82245
Figure 3804: DNA325776, XM_084948, gen.XM_084948
Figure 3805: DNA325777, NM_007062, gen.NM_007062
Figure 3806: PRO82247
Figure 3807: DNA325778, NM_006825, gen.NM_006825
Figure 3808: PRO82248
Figure 3809: DNA325779, XM_115197, gen.XM_115197
Figure 3810: DNA325780, NM_017901, gen.NM_017901
Figure 3811: PRO82250
Figure 3812: DNA325781, NM_032814, gen.NM_032814
Figure 3813: PRO82252
Figure 3814: DNA325782, XM_084889, gen.XM_084889
Figure 3815: PRO82253
Figure 3816: DNA325783, NM_002567, gen.NM_002567
Figure 3817: PRO59001
Figure 3818: DNA325784, XM_084808, gen.XM_084808
Figure 3819: DNA325785, XM_096572, gen.XM_096572
Figure 3820: PRO82255
Figure 3821: DNA325786, XM_045010, gen.XM_045010
Figure 3822: PRO82256
Figure 3823: DNA270677, NM_014868,

gen.NM_014868
Figure 3824: PRO59042
Figure 3825: DNA325787, XM_052893, gen.XM_052893
Figure 3826A-B: DNA325788, XM_045802, gen.XM_045802
Figure 3827: DNA302016, NM_001002, gen.NM_001002
Figure 3828: PRO70989
Figure 3829: DNA325789, NM_053275, gen.NM_053275
Figure 3830: PRO70989
Figure 3831: DNA325790, NM_006253, gen.NM_006253
Figure 3832: PRO82259
Figure 3833: DNA325791, XM_045187, gen.XM_045187
Figure 3834: DNA325792, XM_045963, gen.XM_045963
Figure 3835: DNA325793, XM_006595, gen.XM_006595
Figure 3836: DNA325794, XM_012124, gen.XM_012124
Figure 3837: DNA325795, NM_002813, gen.NM_002813
Figure 3838: PRO82263
Figure 3839: DNA325796, NM_019887, gen.NM_019887
Figure 3840: PRO69471
Figure 3841A-B: DNA325797, XM_038791, gen.XM_038791
Figure 3842: PRO82264
Figure 3843: DNA325798, NM_016638, gen.NM_016638
Figure 3844: PRO82265
Figure 3845: DNA325799, XM_116913, gen.XM_116913
Figure 3846: PRO82266
Figure 3847: DNA325800, NM_006815, gen.NM_006815
Figure 3848: PRO4793
Figure 3849: DNA325801, XM_006566, gen.XM_006566
Figure 3850: PRO82267
Figure 3851: DNA325802, NM_032656, gen.NM_032656
Figure 3852: PRO82268
Figure 3853: DNA325803, XM_055013, gen.XM_055013
Figure 3854: PRO82269
Figure 3855: DNA325804, XM_113737, gen.XM_113737
Figure 3856A-C: DNA325805, XM_045602, gen.XM_045602
Figure 3857: DNA325806, XM_087955, gen.XM_087955

64

Figure 3858: PRO82272
Figure 3859A-B: DNA325807, XM_044334, gen.XM_044334
Figure 3860: PRO82273
Figure 3861: DNA325808, XM_012184, gen.XM_012184
Figure 3862: DNA325809, XM_113702, gen.XM_113702
Figure 3863: PRO82275
Figure 3864A-B: DNA270015, NM_003453, gen.NM_003453
Figure 3865: PRO58410
Figure 3866: DNA226853, NM_004004, gen.NM_004004
Figure 3867: PRO37316
Figure 3868: DNA325810, XM_167911, gen.XM_167911
Figure 3869: DNA325811, XM_167918, gen.XM_167918
Figure 3870: DNA325812, XM_084982, gen.XM_084982
Figure 3871: PRO82278
Figure 3872: DNA325813, NM_024026, gen.NM_024026
Figure 3873: PRO82279
Figure 3874: DNA325814, XM_012638, gen.XM_012638
Figure 3875: PRO82280
Figure 3876: DNA325815, XM_167439, gen.XM_167439
Figure 3877: DNA325816, XM_167906, gen.XM_167906
Figure 3878A-B: DNA325817, NM_014778, gen.NM_014778
Figure 3879: PRO82283
Figure 3880: DNA325818, XM_169414, gen.XM_169414
Figure 3881A-B: DNA325819, NM_006646, gen.NM_006646
Figure 3882: PRO82285
Figure 3883: DNA325820, XM_167892, gen.XM_167892
Figure 3884: DNA325821, NM_015932, gen.NM_015932
Figure 3885: PRO82287
Figure 3886: DNA325822, XM_166273, gen.XM_166273
Figure 3887: DNA304669, NM_002128, gen.NM_002128
Figure 3888: PRO71096
Figure 3889: DNA325823, NM_014887, gen.NM_014887
Figure 3890: PRO82289
Figure 3891: DNA325824, NM_002915, gen.NM_002915
Figure 3892: PRO82290

Figure 3893: DNA325825, XM_085017, gen.XM_085017
Figure 3894: PRO82291
Figure 3895: DNA325826, XM_017432, gen.XM_017432
Figure 3896A-B: DNA270254, NM_002015, gen.NM_002015
Figure 3897: PRO58642
Figure 3898: DNA325827, NM_005830, gen.NM_005830
Figure 3899: PRO58092
Figure 3900: DNA281436, NM_003295, gen.NM_003295
Figure 3901: PRO66275
Figure 3902: DNA325828, XM_038371, gen.XM_038371
Figure 3903A-B: DNA325829, XM_165636, gen.XM_165636
Figure 3904: DNA325830, XM_166266, gen.XM_166266
Figure 3905: PRO82295
Figure 3906: DNA325831, NM_014166, gen.NM_014166
Figure 3907: PRO82296
Figure 3908: DNA325832, NM_021999, gen.NM_021999
Figure 3909: PRO1869
Figure 3910: DNA325833, NM_030925, gen.NM_030925
Figure 3911: PRO82297
Figure 3912: DNA274058, NM_016119, gen.NM_016119
Figure 3913: PRO61999
Figure 3914: DNA325834, NM_032565, gen.NM_032565
Figure 3915: PRO11982
Figure 3916: DNA325835, XM_085044, gen.XM_085044
Figure 3917: DNA325836, XM_165639, gen.XM_165639
Figure 3918: DNA325837, XM_018399, gen.XM_018399
Figure 3919: PRO82300
Figure 3920: DNA325838, XM_058977, gen.XM_058977
Figure 3921: DNA325839, XM_015840, gen.XM_015840
Figure 3922: PRO82302
Figure 3923: DNA325840, XM_007199, gen.XM_007199
Figure 3924: DNA325841, XM_016351, gen.XM_016351
Figure 3925: DNA325842, XM_041209, gen.XM_041209
Figure 3926: DNA325843, XM_058611, gen.XM_058611

66

Figure 3995: PRO2871
Figure 3996: DNA325885, XM_007491, gen.XM_007491
Figure 3997: DNA325886, NM_001641, gen.NM_001641
Figure 3998: PRO82342
Figure 3999: DNA325887, NM_080648, gen.NM_080648
Figure 4000: PRO82343
Figure 4001: DNA325888, NM_080649, gen.NM_080649
Figure 4002: PRO82344
Figure 4003: DNA325889, NM_017807, gen.NM_017807
Figure 4004: PRO82345
Figure 4005A-C: DNA325890, XM_007488, gen.XM_007488
Figure 4006: DNA325891, NM_021178, gen.NM_021178
Figure 4007: PRO82347
Figure 4008: DNA325892, XM_041235, gen.XM_041235
Figure 4009: PRO82348
Figure 4010: DNA325893, NM_002028, gen.NM_002028
Figure 4011: PRO82349
Figure 4012: DNA325894, NM_002083, gen.NM_002083
Figure 4013: PRO82350
Figure 4014A-B: DNA325895, XM_085127, gen.XM_085127
Figure 4015: PRO82351
Figure 4016A-B: DNA325896, NM_001530, gen.NM_001530
Figure 4017: PRO82352
Figure 4018: DNA325897, XM_058210, gen.XM_058210
Figure 4019: DNA325898, XM_085141, gen.XM_085141
Figure 4020: DNA325899, NM_021728, gen.NM_021728
Figure 4021: PRO82355
Figure 4022: DNA325900, NM_002306, gen.NM_002306
Figure 4023: PRO82356
Figure 4024: DNA325901, XM_007328, gen.XM_007328
Figure 4025A-B: DNA325902, XM_051712, gen.XM_051712
Figure 4026: PRO82357
Figure 4027: DNA325903, XM_007324, gen.XM_007324
Figure 4028: PRO82358
Figure 4029: DNA325904, NM_002863, gen.NM_002863
Figure 4030: PRO82359

Figure 4031: DNA325905, XM_085125, gen.XM_085125
Figure 4032: DNA325906, XM_031025, gen.XM_031025
Figure 4033: DNA325907, XM_085066, gen.XM_085066
Figure 4034: DNA325908, XM_096744, gen.XM_096744
Figure 4035: DNA325909, NM_016445, gen.NM_016445
Figure 4036: PRO82364
Figure 4037: DNA325910, NM_016026, gen.NM_016026
Figure 4038: PRO82365
Figure 4039: DNA325911, XM_031074, gen.XM_031074
Figure 4040: DNA325912, NM_001102, gen.NM_001102
Figure 4041: PRO82367
Figure 4042: DNA225649, NM_022137, gen.NM_022137
Figure 4043: PRO36112
Figure 4044: DNA325913, XM_085065, gen.XM_085065
Figure 4045: DNA325914, XM_007441, gen.XM_007441
Figure 4046: DNA325915, NM_006821, gen.NM_006821
Figure 4047: PRO82369
Figure 4048: DNA325916, NM_006432, gen.NM_006432
Figure 4049: PRO2066
Figure 4050A-B: DNA325917, XM_085151, gen.XM_085151
Figure 4051: PRO82370
Figure 4052: DNA325918, NM_002632, gen.NM_002632
Figure 4053: PRO82371
Figure 4054: DNA325919, XM_085162, gen.XM_085162
Figure 4055: DNA325920, NM_012111, gen.NM_012111
Figure 4056: PRO82373
Figure 4057: DNA325921, NM_024824, gen.NM_024824
Figure 4058: PRO82374
Figure 4059: DNA269498, NM_002802, gen.NM_002802
Figure 4060: PRO57917
Figure 4061: DNA325922, XM_058677, gen.XM_058677
Figure 4062: PRO82375
Figure 4063: DNA325923, NM_006888, gen.NM_006888
Figure 4064: PRO4904
Figure 4065: DNA325924, NM_001275,

gen.NM_001275
Figure 4066: PRO2054
Figure 4067: DNA325925, XM_029288,
gen.XM_029288
Figure 4068A-B: DNA325926, XM_016487,
gen.XM_016487
Figure 4069: DNA325927, NM_020414,
gen.NM_020414
Figure 4070: PRO62099
Figure 4071: DNA325928, XM_016486,
gen.XM_016486
Figure 4072: DNA325929, XM_007483,
gen.XM_007483
Figure 4073: DNA325930, XM_028358,
gen.XM_028358
Figure 4074: DNA325931, XM_028347,
gen.XM_028347
Figure 4075: DNA325932, XM_028322,
gen.XM_028322
Figure 4076: PRO82381
Figure 4077: DNA325933, XM_056317,
gen.XM_056317
Figure 4078: PRO82382
Figure 4079: DNA151893, NM_021966,
gen.NM_021966
Figure 4080: PRO12916
Figure 4081: DNA325934, XM_007272,
gen.XM_007272
Figure 4082: DNA325935, XM_090914,
gen.XM_090914
Figure 4083: PRO82383
Figure 4084: DNA325936, NM_022747,
gen.NM_022747
Figure 4085: PRO82384
Figure 4086: DNA325937, XM_041014,
gen.XM_041014
Figure 4087: PRO60575
Figure 4088: DNA325938, NM_003836,
gen.NM_003836
Figure 4089: PRO82385
Figure 4090A-B: DNA325939, XM_040952,
gen.XM_040952
Figure 4091: DNA325940, XM_058618,
gen.XM_058618
Figure 4092: DNA325941, NM_005348,
gen.NM_005348
Figure 4093: PRO82388
Figure 4094: DNA325942, XM_040942,
gen.XM_040942
Figure 4095: DNA226324, NM_014226,
gen.NM_014226
Figure 4096: PRO36787
Figure 4097A-B: DNA325943, XM_007254,
gen.XM_007254
Figure 4098A-B: DNA325944, NM_001969,
gen.NM_001969

Figure 4099: PRO82391
Figure 4100: DNA325945, XM_040898,
gen.XM_040898
Figure 4101: DNA325946, NM_005432,
gen.NM_005432
Figure 4102: PRO60070
Figure 4103A-B: DNA325947, XM_050278,
gen.XM_050278
Figure 4104: PRO82393
Figure 4105: DNA325948, XM_113759,
gen.XM_113759
Figure 4106: DNA325949, NM_006427,
gen.NM_006427
Figure 4107: PRO82395
Figure 4108: DNA325950, NM_021709,
gen.NM_021709
Figure 4109: PRO82396
Figure 4110: DNA103509, NM_005163,
gen.NM_005163
Figure 4111: PRO4836
Figure 4112: DNA325951, NM_017955,
gen.NM_017955
Figure 4113: PRO82397
Figure 4114: DNA325952, XM_088588,
gen.XM_088588
Figure 4115: DNA325953, XM_060012,
gen.XM_060012
Figure 4116: DNA325954, XM_034953,
gen.XM_034953
Figure 4117: PRO82400
Figure 4118: DNA325955, XM_058636,
gen.XM_058636
Figure 4119: DNA325956, XM_035014,
gen.XM_035014
Figure 4120: DNA325957, XM_088587,
gen.XM_088587
Figure 4121: DNA325958, XM_088589,
gen.XM_088589
Figure 4122: DNA325959, XM_071801,
gen.XM_071801
Figure 4123: DNA325960, XM_018054,
gen.XM_018054
Figure 4124: DNA325961, XM_091108,
gen.XM_091108
Figure 4125A-B: DNA325962, XM_039225,
gen.XM_039225
Figure 4126: PRO82408
Figure 4127: DNA325963, XM_165921,
gen.XM_165921
Figure 4128: PRO82409
Figure 4129: DNA325964, XM_007751,
gen.XM_007751
Figure 4130: DNA325965, XM_085203,
gen.XM_085203
Figure 4131: PRO82411
Figure 4132: DNA325966, XM_085204,

gen.XM_085204
Figure 4133: DNA325967, XM_012398,
gen.XM_012398
Figure 4134A-B: DNA325968, XM_036727,
gen.XM_036727
Figure 4135: DNA325969, XM_017240,
gen.XM_017240
Figure 4136: DNA325970, NM_020149,
gen.NM_020149
Figure 4137: PRO82415
Figure 4138A-B: DNA325971, XM_031617,
gen.XM_031617
Figure 4139A-B: DNA325972, NM_001211,
gen.NM_001211
Figure 4140: PRO82417
Figure 4141A-B: DNA151831, NM_004573,
gen.NM_004573
Figure 4142: PRO12198
Figure 4143: DNA325973, NM_130468,
gen.NM_130468
Figure 4144: PRO82418
Figure 4145: DNA325974, XM_031554,
gen.XM_031554
Figure 4146: PRO82419
Figure 4147: DNA325975, XM_031515,
gen.XM_031515
Figure 4148: DNA325976, NM_024111,
gen.NM_024111
Figure 4149: PRO82421
Figure 4150: DNA325977, NM_032196,
gen.NM_032196
Figure 4151: PRO82422
Figure 4152: DNA325978, NM_016359,
gen.NM_016359
Figure 4153: PRO82423
Figure 4154: DNA325979, NM_018454,
gen.NM_018454
Figure 4155: PRO82424
Figure 4156A-B: DNA325980, XM_007545,
gen.XM_007545
Figure 4157: DNA325981, XM_091159,
gen.XM_091159
Figure 4158: PRO82425
Figure 4159: DNA325982, XM_031718,
gen.XM_031718
Figure 4160: DNA325983, XM_085307,
gen.XM_085307
Figure 4161: DNA227559, NM_000070,
gen.NM_000070
Figure 4162: PRO38022
Figure 4163A-B: DNA325984, XM_113823,
gen.XM_113823
Figure 4164: PRO82428
Figure 4165: DNA325985, XM_016713,
gen.XM_016713
Figure 4166: PRO82429

Figure 4167A-B: DNA325986, XM_007531,
gen.XM_007531
Figure 4168: DNA325987, NM_014444,
gen.NM_014444
Figure 4169: PRO82431
Figure 4170A-B: DNA227206, NM_005657,
gen.NM_005657
Figure 4171: PRO37669
Figure 4172: DNA325988, NM_020990,
gen.NM_020990
Figure 4173: PRO82432
Figure 4174: DNA325989, NM_005313,
gen.NM_005313
Figure 4175: PRO2732
Figure 4176: DNA325990, NM_005770,
gen.NM_005770
Figure 4177: PRO82433
Figure 4178: DNA325991, NM_004048,
gen.NM_004048
Figure 4179: PRO4379
Figure 4180: DNA325992, XM_032403,
gen.XM_032403
Figure 4181: PRO82434
Figure 4182: DNA219233, NM_014335,
gen.NM_014335
Figure 4183: PRO34557
Figure 4184A-C: DNA325993, XM_034890,
gen.XM_034890
Figure 4185: PRO82435
Figure 4186: DNA325994, XM_058684,
gen.XM_058684
Figure 4187: DNA325995, NM_003104,
gen.NM_003104
Figure 4188: PRO82437
Figure 4189: DNA325996, XM_007651,
gen.XM_007651
Figure 4190: PRO82438
Figure 4191: DNA325997, XM_090991,
gen.XM_090991
Figure 4192: PRO82439
Figure 4193: DNA325998, NM_016304,
gen.NM_016304
Figure 4194: PRO82440
Figure 4195: DNA325999, NM_017610,
gen.NM_017610
Figure 4196: PRO82441
Figure 4197: DNA326000, NM_004701,
gen.NM_004701
Figure 4198: PRO82442
Figure 4199A-B: DNA326001, XM_012418,
gen.XM_012418
Figure 4200: DNA326002, XM_039702,
gen.XM_039702
Figure 4201: PRO82444
Figure 4202: DNA326003, XM_113266,
gen.XM_113266

Figure 4203: DNA326004, NM_001218,
gen.NM_001218
Figure 4204: PRO54594
Figure 4205: DNA326005, NM_015920,
gen.NM_015920
Figure 4206: PRO82446
Figure 4207: DNA326006, XM_113268,
gen.XM_113268
Figure 4208: DNA255340, NM_017684,
gen.NM_017684
Figure 4209: PRO50409
Figure 4210: DNA326007, NM_002537,
gen.NM_002537
Figure 4211: DNA326008, XM_085283,
gen.XM_085283
Figure 4212: PRO82448
Figure 4213: DNA326009, XM_016985,
gen.XM_016985
Figure 4214: DNA234442, NM_014736,
gen.NM_014736
Figure 4215: PRO38852
Figure 4216: DNA326010, NM_022048,
gen.NM_022048
Figure 4217: PRO82450
Figure 4218: DNA326011, NM_000942,
gen.NM_000942
Figure 4219: PRO2720
Figure 4220: DNA326012, XM_050964,
gen.XM_050964
Figure 4221: DNA326013, XM_007623,
gen.XM_007623
Figure 4222A-B: DNA326014, NM_133375,
gen.NM_133375
Figure 4223: PRO82453
Figure 4224: DNA226646, NM_017882,
gen.NM_017882
Figure 4225: PRO37109
Figure 4226: DNA326015, NM_015322,
gen.NM_015322
Figure 4227: PRO82454
Figure 4228: DNA326016, NM_001003,
gen.NM_001003
Figure 4229: PRO82455
Figure 4230A-B: DNA326017, XM_051463,
gen.XM_051463
Figure 4231: PRO82456
Figure 4232: DNA326018, NM_018357,
gen.NM_018357
Figure 4233: PRO82457
Figure 4234: DNA326019, XM_063639,
gen.XM_063639
Figure 4235: PRO82458
Figure 4236: DNA326020, XM_085249,
gen.XM_085249
Figure 4237: DNA326021, XM_016076,
gen.XM_016076

Figure 4238: PRO82460
Figure 4239: DNA326022, XM_015366,
gen.XM_015366
Figure 4240: PRO82461
Figure 4241: DNA326023, XM_096060,
gen.XM_096060
Figure 4242: DNA287331, NM_002654,
gen.NM_002654
Figure 4243: PRO69595
Figure 4244: DNA326024, XM_037778,
gen.XM_037778
Figure 4245: DNA326025, XM_096842,
gen.XM_096842
Figure 4246: DNA326026, NM_022369,
gen.NM_022369
Figure 4247: PRO82465
Figure 4248: DNA326027, NM_032907,
gen.NM_032907
Figure 4249: PRO82466
Figure 4250: DNA326028, XM_058699,
gen.XM_058699
Figure 4251: DNA326029, XM_118637,
gen.XM_118637
Figure 4252: DNA326030, XM_053585,
gen.XM_053585
Figure 4253: PRO82469
Figure 4254: DNA326031, XM_085239,
gen.XM_085239
Figure 4255: PRO82470
Figure 4256: DNA326032, XM_034897,
gen.XM_034897
Figure 4257A-B: DNA326033, XM_057020,
gen.XM_057020
Figure 4258: PRO82472
Figure 4259: DNA326034, NM_000743,
gen.NM_000743
Figure 4260: PRO61219
Figure 4261: DNA326035, NM_002789,
gen.NM_002789
Figure 4262: PRO60499
Figure 4263: DNA326036, XM_091100,
gen.XM_091100
Figure 4264: PRO82473
Figure 4265: DNA255370, NM_012170,
gen.NM_012170
Figure 4266: PRO50438
Figure 4267: DNA273014, NM_000126,
gen.NM_000126
Figure 4268: PRO61085
Figure 4269: DNA326037, XM_044565,
gen.XM_044565
Figure 4270: DNA326038, NM_025234,
gen.NM_025234
Figure 4271: PRO82475
Figure 4272: DNA326039, XM_044569,
gen.XM_044569

Figure 4273: DNA326040, NM_005724,
gen.NM_005724
Figure 4274: PRO730
Figure 4275: DNA326041, XM_049354,
gen.XM_049354
Figure 4276: PRO82477
Figure 4277: DNA326042, NM_007364,
gen.NM_007364
Figure 4278: DNA326043, XM_044593,
gen.XM_044593
Figure 4279: DNA326044, NM_006791,
gen.NM_006791
Figure 4280: PRO82479
Figure 4281: DNA326045, XM_060042,
gen.XM_060042
Figure 4282: DNA326046, XM_085215,
gen.XM_085215
Figure 4283: DNA326047, NM_001021,
gen.NM_001021
Figure 4284: PRO82482
Figure 4285: DNA326048, XM_031404,
gen.XM_031404
Figure 4286: DNA326049, XM_096844,
gen.XM_096844
Figure 4287: DNA326050, XM_045681,
gen.XM_045681
Figure 4288: PRO82485
Figure 4289: DNA326051, XM_085280,
gen.XM_085280
Figure 4290: DNA326052, NM_022839,
gen.NM_022839
Figure 4291: PRO82487
Figure 4292: DNA326053, XM_031354,
gen.XM_031354
Figure 4293: DNA326054, NM_002168,
gen.NM_002168
Figure 4294: PRO82489
Figure 4295: DNA326055, XM_031292,
gen.XM_031292
Figure 4296: DNA326056, NM_022566,
gen.NM_022566
Figure 4297: PRO82491
Figure 4298A-B: DNA326057, XM_051860,
gen.XM_051860
Figure 4299: PRO82492
Figure 4300: DNA275144, NM_000137,
gen.NM_000137
Figure 4301: PRO62852
Figure 4302: DNA326058, NM_016645,
gen.NM_016645
Figure 4303: PRO82493
Figure 4304: DNA326059, XM_044523,
gen.XM_044523
Figure 4305: DNA150485, NM_006384,
gen.NM_006384
Figure 4306: PRO12774

Figure 4307A-B: DNA326060, XM_044533,
gen.XM_044533
Figure 4308: PRO82495
Figure 4309A-C: DNA326061, XM_054900,
gen.XM_054900
Figure 4310: DNA326062, NM_032162,
gen.NM_032162
Figure 4311A-B: DNA326063, XM_015835,
gen.XM_015835
Figure 4312: DNA326064, NM_018668,
gen.NM_018668
Figure 4313: PRO82499
Figure 4314: DNA326065, XM_085262,
gen.XM_085262
Figure 4315: DNA326066, NM_033544,
gen.NM_033544
Figure 4316: PRO82501
Figure 4317: DNA326067, XM_049372,
gen.XM_049372
Figure 4318: PRO82502
Figure 4319: DNA326068, XM_017971,
gen.XM_017971
Figure 4320: DNA275181, NM_003090,
gen.NM_003090
Figure 4321: PRO62882
Figure 4322: DNA326069, XM_012462,
gen.XM_012462
Figure 4323A-B: DNA326070, XM_085525,
gen.XM_085525
Figure 4324: PRO82505
Figure 4325: DNA326071, XM_165923,
gen.XM_165923
Figure 4326: DNA326072, XM_113836,
gen.XM_113836
Figure 4327: DNA326073, NM_017668,
gen.NM_017668
Figure 4328: PRO82508
Figure 4329: DNA326074, XM_027309,
gen.XM_027309
Figure 4330: PRO82509
Figure 4331: DNA326075, XM_018432,
gen.XM_018432
Figure 4332: PRO82510
Figure 4333: DNA326076, XM_115352,
gen.XM_115352
Figure 4334: DNA326077, XM_027365,
gen.XM_027365
Figure 4335: DNA326078, NM_016641,
gen.NM_016641
Figure 4336: PRO38464
Figure 4337: DNA326079, XM_058796,
gen.XM_058796
Figure 4338: DNA326080, XM_017984,
gen.XM_017984
Figure 4339: PRO82513
Figure 4340: DNA326081, NM_020677,

gen.NM_020677
Figure 4341: PRO82514
Figure 4342: DNA326082, XM_036680,
gen.XM_036680
Figure 4343: PRO37961
Figure 4344A-B: DNA326083, XM_048119,
gen.XM_048119
Figure 4345: PRO82515
Figure 4346: DNA326084, NM_024589,
gen.NM_024589
Figure 4347: PRO82516
Figure 4348: DNA326085, XM_050534,
gen.XM_050534
Figure 4349: PRO82517
Figure 4350: DNA326086, NM_024571,
gen.NM_024571
Figure 4351: PRO82518
Figure 4352: DNA326087, XM_027558,
gen.XM_027558
Figure 4353: DNA326088, XM_008126,
gen.XM_008126
Figure 4354: DNA326089, NM_000517,
gen.NM_000517
Figure 4355: PRO3629
Figure 4356: DNA326090, NM_000558,
gen.NM_000558
Figure 4357: PRO3629
Figure 4358: DNA326091, NM_018032,
gen.NM_018032
Figure 4359: PRO38311
Figure 4360: DNA273839, NM_006428,
gen.NM_006428
Figure 4361: PRO61799
Figure 4362A-B: DNA256844, NM_005632,
gen.NM_005632
Figure 4363: PRO51775
Figure 4364: DNA326092, XM_083939,
gen.XM_083939
Figure 4365: PRO82521
Figure 4366: DNA326093, NM_058192,
gen.NM_058192
Figure 4367: PRO82522
Figure 4368: DNA326094, XM_027412,
gen.XM_027412
Figure 4369: PRO82523
Figure 4370: DNA256886, NM_014587,
gen.NM_014587
Figure 4371: PRO51815
Figure 4372A-B: DNA326095, NM_001287,
gen.NM_001287
Figure 4373: PRO38480
Figure 4374: DNA254781, NM_016111,
gen.NM_016111
Figure 4375: PRO49879
Figure 4376: DNA326096, XM_034586,
gen.XM_034586

Figure 4377: PRO82524
Figure 4378: DNA326097, NM_023936,
gen.NM_023936
Figure 4379: PRO82525
Figure 4380: DNA326098, XM_034590,
gen.XM_034590
Figure 4381: PRO82526
Figure 4382: DNA326099, NM_002952,
gen.NM_002952
Figure 4383: PRO82527
Figure 4384: DNA326100, NM_006453,
gen.NM_006453
Figure 4385: PRO82528
Figure 4386: DNA326101, NM_014353,
gen.NM_014353
Figure 4387: PRO82529
Figure 4388: DNA326102, NM_032271,
gen.NM_032271
Figure 4389: PRO82530
Figure 4390: DNA326103, XM_028848,
gen.XM_028848
Figure 4391: PRO82531
Figure 4392: DNA326104, NM_006711,
gen.NM_006711
Figure 4393: PRO82532
Figure 4394: DNA326105, NM_080594,
gen.NM_080594
Figure 4395: PRO82533
Figure 4396: DNA326106, NM_024339,
gen.NM_024339
Figure 4397: PRO82534
Figure 4398: DNA326107, NM_016639,
gen.NM_016639
Figure 4399: PRO12683
Figure 4400: DNA326108, NM_021195,
gen.NM_021195
Figure 4401: PRO82535
Figure 4402: DNA326109, NM_004203,
gen.NM_004203
Figure 4403: PRO82536
Figure 4404: DNA326110, XM_058784,
gen.XM_058784
Figure 4405: PRO82537
Figure 4406: DNA326111, NM_024507,
gen.NM_024507
Figure 4407: PRO82538
Figure 4408: DNA326112, NM_006799,
gen.NM_006799
Figure 4409: PRO303
Figure 4410A-C: DNA326113, XM_036528,
gen.XM_036528
Figure 4411: DNA326114, NM_025108,
gen.NM_025108
Figure 4412: PRO82540
Figure 4413A-C: DNA326115, XM_165411,
gen.XM_165411

Figure 4414: DNA326116, NM_016292, gen.NM_016292
Figure 4415: PRO82542
Figure 4416: DNA326117, NM_002484, gen.NM_002484
Figure 4417: PRO82543
Figure 4418: DNA326118, XM_113845, gen.XM_113845
Figure 4419: PRO82544
Figure 4420: DNA326119, XM_113843, gen.XM_113843
Figure 4421: DNA97293, NM_003366, gen.NM_003366
Figure 4422: PRO3640
Figure 4423: DNA326120, NM_006110, gen.NM_006110
Figure 4424: PRO82546
Figure 4425: DNA326121, XM_085445, gen.XM_085445
Figure 4426: DNA326122, XM_113876, gen.XM_113876
Figure 4427A-B: DNA326123, XM_055195, gen.XM_055195
Figure 4428: PRO82548
Figure 4429: DNA326124, XM_113291, gen.XM_113291
Figure 4430A-B: DNA326125, XM_007988, gen.XM_007988
Figure 4431: DNA326126, XM_113874, gen.XM_113874
Figure 4432: DNA326127, XM_102377, gen.XM_102377
Figure 4433: PRO82551
Figure 4434: DNA326128, XM_086278, gen.XM_086278
Figure 4435: DNA326129, XM_085452, gen.XM_085452
Figure 4436: DNA326130, NM_018054, gen.NM_018054
Figure 4437: PRO82554
Figure 4438A-B: DNA326131, XM_056260, gen.XM_056260
Figure 4439: PRO82555
Figure 4440: DNA326132, NM_032626, gen.NM_032626
Figure 4441: PRO82556
Figure 4442: DNA326133, NM_005030, gen.NM_005030
Figure 4443: PRO82557
Figure 4444: DNA326134, NM_032486, gen.NM_032486
Figure 4445: PRO82558
Figure 4446: DNA289522, NM_005003, gen.NM_005003
Figure 4447: PRO70276
Figure 4448: DNA326135, XM_085340,

gen.XM_085340
Figure 4449: DNA326136, NM_003752, gen.NM_003752
Figure 4450: PRO60325
Figure 4451: DNA326137, NM_012248, gen.NM_012248
Figure 4452: PRO82560
Figure 4453A-B: DNA326138, XM_046035, gen.XM_046035
Figure 4454: DNA326139, NM_024671, gen.NM_024671
Figure 4455: PRO82562
Figure 4456: DNA326140, NM_033410, gen.NM_033410
Figure 4457: PRO82563
Figure 4458: DNA326141, NM_024031, gen.NM_024031
Figure 4459: PRO82564
Figure 4460A-B: DNA326142, XM_034375, gen.XM_034375
Figure 4461: DNA326143, XM_012569, gen.XM_012569
Figure 4462: DNA326144, XM_050194, gen.XM_050194
Figure 4463: DNA326145, XM_008106, gen.XM_008106
Figure 4464: PRO82567
Figure 4465: DNA326146, NM_004960, gen.NM_004960
Figure 4466: PRO82568
Figure 4467: DNA326147, XM_113293, gen.XM_113293
Figure 4468: DNA326148, NM_022744, gen.NM_022744
Figure 4469: PRO82570
Figure 4470: DNA326149, NM_024048, gen.NM_024048
Figure 4471: PRO82571
Figure 4472: DNA326150, XM_018088, gen.XM_018088
Figure 4473: PRO82572
Figure 4474: DNA326151, XM_007963, gen.XM_007963
Figure 4475: PRO82573
Figure 4476: DNA274002, NM_014321, gen.NM_014321
Figure 4477: PRO61948
Figure 4478: DNA326152, XM_015700, gen.XM_015700
Figure 4479: DNA326153, XM_051219, gen.XM_051219
Figure 4480: DNA326154, XM_085393, gen.XM_085393
Figure 4481: PRO82576
Figure 4482: DNA326155, XM_085395, gen.XM_085395

Figure 4483: DNA326156, XM_091270, gen.XM_091270
Figure 4484: DNA326157, XM_165656, gen.XM_165656
Figure 4485: DNA326158, NM_032330, gen.NM_032330
Figure 4486: PRO82579
Figure 4487: DNA254532, NM_001043, gen.NM_001043
Figure 4488: PRO49639
Figure 4489: DNA326159, XM_165658, gen.XM_165658
Figure 4490: DNA326160, XM_166285, gen.XM_166285
Figure 4491: DNA326161, XM_166282, gen.XM_166282
Figure 4492: PRO82582
Figure 4493: DNA326162, XM_165657, gen.XM_165657
Figure 4494: PRO82583
Figure 4495: DNA326163, NM_032038, gen.NM_032038
Figure 4496: PRO82584
Figure 4497: DNA326164, XM_008065, gen.XM_008065
Figure 4498: DNA326165, NM_017458, gen.NM_017458
Figure 4499: PRO82585
Figure 4500: DNA326166, NM_005115, gen.NM_005115
Figure 4501: PRO82586
Figure 4502: DNA326167, NM_024516, gen.NM_024516
Figure 4503: PRO82587
Figure 4504: DNA326168, XM_113299, gen.XM_113299
Figure 4505: DNA326169, XM_055771, gen.XM_055771
Figure 4506: PRO82589
Figure 4507: DNA271171, NM_007317, gen.NM_007317
Figure 4508: PRO59491
Figure 4509: DNA326170, XM_008064, gen.XM_008064
Figure 4510: PRO82590
Figure 4511: DNA326171, NM_003123, gen.NM_003123
Figure 4512: PRO2355
Figure 4513: DNA326172, XM_085442, gen.XM_085442
Figure 4514: DNA326173, XM_055132, gen.XM_055132
Figure 4515: PRO82592
Figure 4516: DNA274180, NM_007074, gen.NM_007074
Figure 4517: PRO62110

Figure 4518: DNA326174, NM_002720, gen.NM_002720
Figure 4519: PRO42208
Figure 4520: DNA287355, NM_000034, gen.NM_000034
Figure 4521: PRO69617
Figure 4522: DNA326175, NM_031478, gen.NM_031478
Figure 4523: PRO82593
Figure 4524: DNA326176, XM_085434, gen.XM_085434
Figure 4525: PRO82594
Figure 4526: DNA326177, XM_058116, gen.XM_058116
Figure 4527: DNA326178, XM_165649, gen.XM_165649
Figure 4528: DNA326179, XM_165647, gen.XM_165647
Figure 4529: PRO82597
Figure 4530: DNA194805, NM_014685, gen.NM_014685
Figure 4531: PRO24075
Figure 4532: DNA326180, XM_166277, gen.XM_166277
Figure 4533: PRO82598
Figure 4534: DNA326181, XM_165645, gen.XM_165645
Figure 4535: DNA326182, NM_018110, gen.NM_018110
Figure 4536: PRO82599
Figure 4537: DNA326183, XM_165648, gen.XM_165648
Figure 4538: DNA326184, XM_167453, gen.XM_167453
Figure 4539: DNA326185, NM_022770, gen.NM_022770
Figure 4540: PRO82602
Figure 4541: DNA326186, XM_167456, gen.XM_167456
Figure 4542: PRO82603
Figure 4543: DNA326187, XM_058745, gen.XM_058745
Figure 4544: DNA326188, XM_091420, gen.XM_091420
Figure 4545: DNA326189, NM_004691, gen.NM_004691
Figure 4546: PRO82606
Figure 4547: DNA326190, NM_000196, gen.NM_000196
Figure 4548: PRO82607
Figure 4549A-B: DNA326191, NM_004360, gen.NM_004360
Figure 4550: PRO2672
Figure 4551: DNA326192, XM_039306, gen.XM_039306
Figure 4552: PRO82608

gen.XM_047436
Figure 4625: PRO82641
Figure 4626: DNA227234, NM_002386,
gen.NM_002386
Figure 4627: PRO37697
Figure 4628: DNA326230, NM_014972,
gen.NM_014972
Figure 4629: PRO82642
Figure 4630: DNA326231, XM_071873,
gen.XM_071873
Figure 4631: PRO82643
Figure 4632: DNA326232, XM_047525,
gen.XM_047525
Figure 4633: DNA326233, NM_000977,
gen.NM_000977
Figure 4634: PRO82645
Figure 4635: DNA326234, NM_033251,
gen.NM_033251
Figure 4636: PRO82646
Figure 4637: DNA326235, XM_085408,
gen.XM_085408
Figure 4638: DNA326236, NM_004933,
gen.NM_004933
Figure 4639: PRO2198
Figure 4640: DNA326237, XM_113882,
gen.XM_113882
Figure 4641: DNA326238, XM_010938,
gen.XM_010938
Figure 4642: DNA326239, NM_006761,
gen.NM_006761
Figure 4643: PRO39530
Figure 4644A-B: DNA326240, XM_017096,
gen.XM_017096
Figure 4645: DNA326241, XM_033714,
gen.XM_033714
Figure 4646A-B: DNA326242, XM_033689,
gen.XM_033689
Figure 4647: DNA326243, NM_002615,
gen.NM_002615
Figure 4648: DNA326244, XM_056082,
gen.XM_056082
Figure 4649: PRO82654
Figure 4650: DNA326245, XM_008557,
gen.XM_008557
Figure 4651: DNA326246, XM_045183,
gen.XM_045183
Figure 4652: PRO82656
Figure 4653: DNA326247, XM_113901,
gen.XM_113901
Figure 4654: DNA326248, NM_080822,
gen.NM_080822
Figure 4655: PRO82658
Figure 4656A-B: DNA326249, XM_029438,
gen.XM_029438
Figure 4657: PRO82659
Figure 4658: DNA326250, XM_008509,

gen.XM_008509
Figure 4659: DNA326251, XM_085687,
gen.XM_085687
Figure 4660: PRO82661
Figure 4661: DNA326252, XM_027825,
gen.XM_027825
Figure 4662: PRO82662
Figure 4663: DNA326253, XM_053717,
gen.XM_053717
Figure 4664: PRO82663
Figure 4665: DNA326254, NM_005022,
gen.NM_005022
Figure 4666: PRO62780
Figure 4667A-B: DNA326255, XM_028398,
gen.XM_028398
Figure 4668: PRO82664
Figure 4669: DNA326256, NM_000018,
gen.NM_000018
Figure 4670: PRO66265
Figure 4671: DNA326257, XM_008334,
gen.XM_008334
Figure 4672: DNA326258, NM_024297,
gen.NM_024297
Figure 4673: PRO82665
Figure 4674: DNA326259, XM_113324,
gen.XM_113324
Figure 4675: DNA326260, XM_012676,
gen.XM_012676
Figure 4676: PRO82667
Figure 4677: DNA326261, XM_085691,
gen.XM_085691
Figure 4678: DNA326262, XM_028417,
gen.XM_028417
Figure 4679: PRO82669
Figure 4680A-B: DNA326263, XM_041964,
gen.XM_041964
Figure 4681: PRO82670
Figure 4682: DNA326264, NM_019013,
gen.NM_019013
Figure 4683: PRO82671
Figure 4684: DNA326265, XM_008538,
gen.XM_008538
Figure 4685: PRO82672
Figure 4686: DNA326266, XM_008441,
gen.XM_008441
Figure 4687: DNA97300, NM_001416,
gen.NM_001416
Figure 4688: PRO3647
Figure 4689: DNA326267, NM_004870,
gen.NM_004870
Figure 4690: PRO82674
Figure 4691: DNA326268, NM_006942,
gen.NM_006942
Figure 4692: PRO82675
Figure 4693: DNA326269, XM_008679,
gen.XM_008679

gen.NM_015584
Figure 4762: PRO82707
Figure 4763: DNA326308, NM_000638,
gen.NM_000638
Figure 4764: PRO82708
Figure 4765A-B: DNA326309, XM_031466,
gen.XM_031466
Figure 4766: PRO82709
Figure 4767: DNA326310, XM_031415,
gen.XM_031415
Figure 4768: DNA326311, XM_117066,
gen.XM_117066
Figure 4769: DNA326312, XM_031427,
gen.XM_031427
Figure 4770: PRO82712
Figure 4771: DNA326313, NM_032322,
gen.NM_032322
Figure 4772: PRO82713
Figure 4773A-B: DNA326314, XM_050101,
gen.XM_050101
Figure 4774: PRO82714
Figure 4775: DNA326315, XM_056730,
gen.XM_056730
Figure 4776: PRO82715
Figure 4777: DNA326316, XM_008462,
gen.XM_008462
Figure 4778: DNA287427, NM_002815,
gen.NM_002815
Figure 4779: PRO69684
Figure 4780: DNA326317, NM_015544,
gen.NM_015544
Figure 4781: PRO82717
Figure 4782: DNA188351, NM_005623,
gen.NM_005623
Figure 4783: PRO21887
Figure 4784: DNA326318, NM_002878,
gen.NM_002878
Figure 4785: PRO82718
Figure 4786: DNA326319, NM_133627,
gen.NM_133627
Figure 4787: PRO82719
Figure 4788: DNA326320, NM_133630,
gen.NM_133630
Figure 4789: PRO82720
Figure 4790: DNA326321, NM_133629,
gen.NM_133629
Figure 4791: PRO82721
Figure 4792: DNA326322, NM_018096,
gen.NM_018096
Figure 4793: PRO37791
Figure 4794A-B: DNA326323, XM_039474,
gen.XM_039474
Figure 4795: PRO82722
Figure 4796A-B: DNA66475, NM_004448,
gen.NM_004448
Figure 4797: PRO1204

Figure 4798: DNA326324, NM_000981,
gen.NM_000981
Figure 4799: PRO4738
Figure 4800A-B: DNA326325, XM_008150,
gen.XM_008150
Figure 4801: DNA326326, NM_000978,
gen.NM_000978
Figure 4802: PRO82724
Figure 4803: DNA326327, XM_058830,
gen.XM_058830
Figure 4804: PRO82725
Figure 4805: DNA270979, NM_002809,
gen.NM_002809
Figure 4806: PRO59309
Figure 4807: DNA326328, NM_000422,
gen.NM_000422
Figure 4808: PRO82726
Figure 4809: DNA326329, XM_008579,
gen.XM_008579
Figure 4810: DNA326330, NM_002276,
gen.NM_002276
Figure 4811: PRO82728
Figure 4812: DNA272889, NM_002275,
gen.NM_002275
Figure 4813: PRO60979
Figure 4814: DNA326331, NM_002274,
gen.NM_002274
Figure 4815: PRO82729
Figure 4816: DNA326332, NM_000526,
gen.NM_000526
Figure 4817: PRO82730
Figure 4818: DNA326333, XM_049937,
gen.XM_049937
Figure 4819A-B: DNA326334, XM_113334,
gen.XM_113334
Figure 4820: DNA226389, NM_000964,
gen.NM_000964
Figure 4821: PRO36852
Figure 4822: DNA326335, NM_006455,
gen.NM_006455
Figure 4823: PRO82732
Figure 4824: DNA326336, XM_113938,
gen.XM_113938
Figure 4825: DNA326337, XM_036465,
gen.XM_036465
Figure 4826: DNA326338, XM_055061,
gen.XM_055061
Figure 4827A-B: DNA326339, XM_036462,
gen.XM_036462
Figure 4828: PRO82736
Figure 4829: DNA326340, XM_048654,
gen.XM_048654
Figure 4830: DNA326341, NM_025197,
gen.NM_025197
Figure 4831: PRO82737
Figure 4832: DNA326342, XM_054038,

gen.XM_054038
Figure 4833: PRO82738
Figure 4834: DNA326343, NM_002265,
gen.NM_002265
Figure 4835: PRO82739
Figure 4836: DNA326344, XM_032201,
gen.XM_032201
Figure 4837: PRO82740
Figure 4838: DNA326345, NM_012138,
gen.NM_012138
Figure 4839: PRO82741
Figure 4840: DNA326346, XM_018534,
gen.XM_018534
Figure 4841: DNA227873, NM_001050,
gen.NM_001050
Figure 4842: PRO38336
Figure 4843: DNA270975, NM_000386,
gen.NM_000386
Figure 4844: PRO59305
Figure 4845: DNA88378, NM_002087,
gen.NM_002087
Figure 4846: PRO2769
Figure 4847: DNA326347, NM_016016,
gen.NM_016016
Figure 4848: PRO82743
Figure 4849: DNA326348, XM_012642,
gen.XM_012642
Figure 4850A-B: DNA326349, NM_005474,
gen.NM_005474
Figure 4851: PRO82745
Figure 4852: DNA326350, XM_045901,
gen.XM_045901
Figure 4853: PRO82746
Figure 4854: DNA257428, NM_032376,
gen.NM_032376
Figure 4855: PRO52010
Figure 4856: DNA326351, XM_008351,
gen.XM_008351
Figure 4857: DNA326352, XM_032852,
gen.XM_032852
Figure 4858: PRO82748
Figure 4859: DNA326353, NM_025233,
gen.NM_025233
Figure 4860: PRO82749
Figure 4861: DNA326354, XM_032817,
gen.XM_032817
Figure 4862: PRO82750
Figure 4863: DNA326355, XM_032813,
gen.XM_032813
Figure 4864: DNA326356, XM_032766,
gen.XM_032766
Figure 4865: DNA326357, NM_003766,
gen.NM_003766
Figure 4866: PRO82753
Figure 4867: DNA326358, XM_008401,
gen.XM_008401

Figure 4868: PRO82754
Figure 4869: DNA326359, XM_008402,
gen.XM_008402
Figure 4870: PRO82755
Figure 4871: DNA326360, NM_017595,
gen.NM_017595
Figure 4872: PRO82756
Figure 4873: DNA326361, XM_085636,
gen.XM_085636
Figure 4874: PRO82757
Figure 4875: DNA326362, NM_006373,
gen.NM_006373
Figure 4876: PRO82758
Figure 4877: DNA196642, NM_005440,
gen.NM_005440
Figure 4878: PRO25115
Figure 4879A-B: DNA270901, NM_004247,
gen.NM_004247
Figure 4880: DNA326363, XM_050159,
gen.XM_050159
Figure 4881: DNA326364, XM_083983,
gen.XM_083983
Figure 4882: PRO82760
Figure 4883A-B: DNA326365, NM_021079,
gen.NM_021079
Figure 4884: PRO82761
Figure 4885: DNA326366, NM_133373,
gen.NM_133373
Figure 4886: PRO82762
Figure 4887: DNA97290, NM_002512,
gen.NM_002512
Figure 4888: PRO3637
Figure 4889: DNA227071, NM_000269,
gen.NM_000269
Figure 4890: PRO37534
Figure 4891: DNA227764, NM_003971,
gen.NM_003971
Figure 4892: PRO38227
Figure 4893A-B: DNA326367, NM_020038,
gen.NM_020038
Figure 4894: PRO82763
Figure 4895A-B: DNA326368, NM_020037,
gen.NM_020037
Figure 4896: PRO82764
Figure 4897: DNA326369, XM_037971,
gen.XM_037971
Figure 4898: DNA254791, NM_018346,
gen.NM_018346
Figure 4899: PRO49888
Figure 4900: DNA287425, NM_018509,
gen.NM_018509
Figure 4901: PRO69682
Figure 4902A-B: DNA326370, XM_008432,
gen.XM_008432
Figure 4903: DNA88554, NM_000250,
gen.NM_000250

79

Figure 4904: PRO2839
Figure 4905: DNA326371, XM_113919,
gen.XM_113919
Figure 4906: DNA326372, NM_017777,
gen.NM_017777
Figure 4907: PRO82768
Figure 4908: DNA326373, NM_006924,
gen.NM_006924
Figure 4909: PRO82769
Figure 4910: DNA326374, XM_115480,
gen.XM_115480
Figure 4911: DNA326375, NM_005831,
gen.NM_005831
Figure 4912: PRO59328
Figure 4913: DNA326376, XM_117061,
gen.XM_117061
Figure 4914: PRO82771
Figure 4915: DNA326377, XM_008459,
gen.XM_008459
Figure 4916A-B: DNA326378, XM_012651,
gen.XM_012651
Figure 4917: DNA326379, NM_021626,
gen.NM_021626
Figure 4918: PRO302
Figure 4919: DNA287291, NM_021213,
gen.NM_021213
Figure 4920: PRO69561
Figure 4921A-B: DNA326380, NM_004859,
gen.NM_004859
Figure 4922: PRO82774
Figure 4923: DNA326381, XM_083966,
gen.XM_083966
Figure 4924: DNA326382, XM_044426,
gen.XM_044426
Figure 4925: PRO82776
Figure 4926: DNA326383, XM_008253,
gen.XM_008253
Figure 4927: DNA326384, XM_044394,
gen.XM_044394
Figure 4928: PRO10400
Figure 4929: DNA326385, NM_017647,
gen.NM_017647
Figure 4930: PRO82778
Figure 4931: DNA326386, NM_007372,
gen.NM_007372
Figure 4932: PRO82779
Figure 4933: DNA326387, NM_002401,
gen.NM_002401
Figure 4934: PRO37764
Figure 4935: DNA326388, XM_044376,
gen.XM_044376
Figure 4936A-B: DNA150457, NM_006039,
gen.NM_006039
Figure 4937: PRO12265
Figure 4938: DNA326389, XM_044367,
gen.XM_044367

Figure 4939: DNA227055, NM_002634,
gen.NM_002634
Figure 4940: PRO37518
Figure 4941: DNA326390, XM_011118,
gen.XM_011118
Figure 4942: DNA326391, XM_055199,
gen.XM_055199
Figure 4943A-B: DNA326392, XM_044372,
gen.XM_044372
Figure 4944: DNA326393, XM_113315,
gen.XM_113315
Figure 4945: DNA326394, XM_012609,
gen.XM_012609
Figure 4946: DNA326395, NM_005220,
gen.NM_005220
Figure 4947: PRO82787
Figure 4948: DNA326396, XM_085589,
gen.XM_085589
Figure 4949: PRO82788
Figure 4950: DNA326397, XM_012634,
gen.XM_012634
Figure 4951: DNA326398, XM_085627,
gen.XM_085627
Figure 4952: PRO82790
Figure 4953: DNA150814, NM_002086,
gen.NM_002086
Figure 4954: PRO12806
Figure 4955: DNA326399, NM_024844,
gen.NM_024844
Figure 4956: PRO82791
Figure 4957: DNA326400, XM_041583,
gen.XM_041583
Figure 4958: DNA326401, XM_046932,
gen.XM_046932
Figure 4959: PRO82792
Figure 4960: DNA326402, NM_004524,
gen.NM_004524
Figure 4961: PRO82793
Figure 4962A-B: DNA326403, XM_113951,
gen.XM_113951
Figure 4963A-B: DNA88430, NM_000213,
gen.NM_000213
Figure 4964: PRO2788
Figure 4965A-B: DNA326404, XM_036104,
gen.XM_036104
Figure 4966: PRO82794
Figure 4967: DNA326405, NM_000154,
gen.NM_000154
Figure 4968: PRO82795
Figure 4969: DNA326406, NM_005324,
gen.NM_005324
Figure 4970: PRO11403
Figure 4971A-B: DNA326407, XM_036115,
gen.XM_036115
Figure 4972: PRO82796
Figure 4973: DNA326408, XM_054344,

80

gen.XM_054344
Figure 4974: PRO82797
Figure 4975: DNA274755, NM_002766,
gen.NM_002766
Figure 4976: PRO70703
Figure 4977A-B: DNA326409, XM_085531,
gen.XM_085531
Figure 4978: DNA326410, XM_113892,
gen.XM_113892
Figure 4979: PRO82799
Figure 4980: DNA326411, XM_017578,
gen.XM_017578
Figure 4981: PRO82800
Figure 4982: DNA326412, XM_036785,
gen.XM_036785
Figure 4983: PRO39201
Figure 4984: DNA326413, XM_097043,
gen.XM_097043
Figure 4985: DNA129504, NM_001168,
gen.NM_001168
Figure 4986: PRO7143
Figure 4987: DNA326414, XM_037196,
gen.XM_037196
Figure 4988: DNA326415, XM_037195,
gen.XM_037195
Figure 4989: DNA326416, XM_045104,
gen.XM_045104
Figure 4990: PRO37540
Figure 4991: DNA326417, XM_085563,
gen.XM_085563
Figure 4992A-B: DNA326418, XM_085716,
gen.XM_085716
Figure 4993: PRO82805
Figure 4994A-B: DNA326419, XM_049934,
gen.XM_049934
Figure 4995: DNA326420, XM_049931,
gen.XM_049931
Figure 4996A-B: DNA326421, XM_045581,
gen.XM_045581
Figure 4997: PRO82807
Figure 4998: DNA326422, XM_113945,
gen.XM_113945
Figure 4999: DNA326423, XM_046481,
gen.XM_046481
Figure 5000: DNA326424, XM_097195,
gen.XM_097195
Figure 5001: DNA326425, XM_097193,
gen.XM_097193
Figure 5002: DNA326426, NM_004309,
gen.NM_004309
Figure 5003: PRO61246
Figure 5004: DNA326427, XM_046472,
gen.XM_046472
Figure 5005: PRO82812
Figure 5006: DNA326428, NM_016286,
gen.NM_016286

Figure 5007: PRO82813
Figure 5008: DNA326429, NM_004127,
gen.NM_004127
Figure 5009: PRO82814
Figure 5010A-C: DNA326430, XM_113943,
gen.XM_113943
Figure 5011: DNA326431, XM_113330,
gen.XM_113330
Figure 5012: PRO82816
Figure 5013: DNA326432, XM_113303,
gen.XM_113303
Figure 5014: DNA287234, NM_031968,
gen.NM_031968
Figure 5015: PRO69513
Figure 5016: DNA326433, NM_022158,
gen.NM_022158
Figure 5017: PRO82818
Figure 5018: DNA326434, XM_038424,
gen.XM_038424
Figure 5019: DNA326435, XM_085735,
gen.XM_085735
Figure 5020: DNA326436, XM_046765,
gen.XM_046765
Figure 5021: DNA326437, XM_046769,
gen.XM_046769
Figure 5022: DNA326438, XM_046767,
gen.XM_046767
Figure 5023: DNA273694, NM_006101,
gen.NM_006101
Figure 5024: PRO61661
Figure 5025A-B: DNA326439, XM_028744,
gen.XM_028744
Figure 5026: DNA326440, XM_165954,
gen.XM_165954
Figure 5027: DNA326441, XM_041678,
gen.XM_041678
Figure 5028: DNA326442, XM_113343,
gen.XM_113343
Figure 5029: PRO82825
Figure 5030: DNA326443, XM_067325,
gen.XM_067325
Figure 5031: DNA326444, XM_012741,
gen.XM_012741
Figure 5032: DNA326445, NM_014214,
gen.NM_014214
Figure 5033: PRO82828
Figure 5034A-B: DNA326446, XM_035640,
gen.XM_035640
Figure 5035: PRO82829
Figure 5036: DNA326447, XM_016382,
gen.XM_016382
Figure 5037: DNA326448, NM_032933,
gen.NM_032933
Figure 5038: PRO82831
Figure 5039: DNA274690, NM_006938,
gen.NM_006938

Figure 5040A-B: DNA88457, NM_000227,
gen.NM_000227
Figure 5041: PRO2799
Figure 5042: DNA326449, XM_085791,
gen.XM_085791
Figure 5043: DNA326450, XM_085789,
gen.XM_085789
Figure 5044: PRO82833
Figure 5045: DNA326451, XM_085790,
gen.XM_085790
Figure 5046: DNA326452, XM_015755,
gen.XM_015755
Figure 5047: PRO82835
Figure 5048: DNA326453, XM_097232,
gen.XM_097232
Figure 5049: DNA326454, XM_085788,
gen.XM_085788
Figure 5050: DNA88281, NM_001944,
gen.NM_001944
Figure 5051: PRO2267
Figure 5052: DNA271841, NM_003787,
gen.NM_003787
Figure 5053: PRO60121
Figure 5054: DNA326455, XM_008723,
gen.XM_008723
Figure 5055: DNA326456, XM_084007,
gen.XM_084007
Figure 5056: DNA256813, NM_018255,
gen.NM_018255
Figure 5057: PRO51744
Figure 5058: DNA326457, XM_085775,
gen.XM_085775
Figure 5059: PRO82840
Figure 5060: DNA326458, NM_138443,
gen.NM_138443
Figure.5061: PRO82841
Figure 5062: DNA326459, XM_038872,
gen.XM_038872
Figure 5063: PRO82842
Figure 5064: DNA326460, XM_086779,
gen.XM_086779
Figure 5065: DNA326461, XM_167363,
gen.XM_167363
Figure 5066: DNA326462, XM_031944,
gen.XM_031944
Figure 5067: DNA326463, NM_000985,
gen.NM_000985
Figure 5068: PRO82846
Figure 5069: DNA326464, NM_002396,
gen.NM_002396
Figure 5070: PRO61113
Figure 5071: DNA326465, XM_166288,
gen.XM_166288
Figure 5072: DNA326466, NM_004539,
gen.NM_004539
Figure 5073: PRO60800

Figure 5074: DNA326467, XM_006937,
gen.XM_006937
Figure 5075: DNA326468, XM_085779,
gen.XM_085779
Figure 5076: DNA326469, XM_011089,
gen.XM_011089
Figure 5077: PRO82850
Figure 5078: DNA326470, XM_169540,
gen.XM_169540
Figure 5079: PRO82851
Figure 5080: DNA326471, XM_167008,
gen.XM_167008
Figure 5081: PRO82852
Figure 5082: DNA326472, XM_048471,
gen.XM_048471
Figure 5083A-B: DNA326473, XM_008812,
gen.XM_008812
Figure 5084A-B: DNA326474, XM_117096,
gen.XM_117096
Figure 5085: PRO82855
Figure 5086: DNA326475, NM_002385,
gen.NM_002385
Figure 5087: PRO82856
Figure 5088: DNA326476, XM_015241,
gen.XM_015241
Figure 5089A-B: DNA326477, XM_008695,
gen.XM_008695
Figure 5090A-B: DNA326478, XM_041872,
gen.XM_041872
Figure 5091: PRO82859
Figure 5092: DNA326479, XM_051586,
gen.XM_051586
Figure 5093: DNA326480, NM_003712,
gen.NM_003712
Figure 5094: PRO1077
Figure 5095: DNA326481, XM_042018,
gen.XM_042018
Figure 5096: PRO2560
Figure 5097: DNA326482, XM_114018,
gen.XM_114018
Figure 5098: DNA326483, NM_017876,
gen.NM_017876
Figure 5099: PRO82861
Figure 5100: DNA326484, NM_031990,
gen.NM_031990
Figure 5101: PRO82862
Figure 5102: DNA326485, NM_002819,
gen.NM_002819
Figure 5103: PRO62899
Figure 5104: DNA326486, NM_005224,
gen.NM_005224
Figure 5105: PRO82863
Figure 5106: DNA326487, XM_037565,
gen.XM_037565
Figure 5107: PRO82864
Figure 5108: DNA326488, XM_092042,

gen.XM_092042
Figure 5109: DNA326489, XM_037572,
gen.XM_037572
Figure 5110: DNA326490, XM_009279,
gen.XM_009279
Figure 5111: PRO82867
Figure 5112: DNA326491, NM_002085,
gen.NM_002085
Figure 5113A-B: DNA326492, XM_009277,
gen.XM_009277
Figure 5114: DNA326493, XM_012913,
gen.XM_012913
Figure 5115: DNA274101, NM_001687,
gen.NM_001687
Figure 5116: PRO62039
Figure 5117: DNA326494, XM_028067,
gen.XM_028067
Figure 5118: PRO82871
Figure 5119: DNA326495, XM_028064,
gen.XM_028064
Figure 5120: DNA326496, NM_024407,
gen.NM_024407
Figure 5121: PRO82872
Figure 5122: DNA326497, NM_000156,
gen.NM_000156
Figure 5123: PRO58046
Figure 5124: DNA326498, NM_138924,
gen.NM_138924
Figure 5125: PRO82873
Figure 5126: DNA326499, NM_001018,
gen.NM_001018
Figure 5127: PRO10485
Figure 5128: DNA326500, XM_086101,
gen.XM_086101
Figure 5129: PRO82874
Figure 5130: DNA326501, XM_086102,
gen.XM_086102
Figure 5131: DNA326502, XM_047584,
gen.XM_047584
Figure 5132A-B: DNA326503, XM_047600,
gen.XM_047600
Figure 5133: PRO38496
Figure 5134: DNA326504, XM_097420,
gen.XM_097420
Figure 5135A-B: DNA326505, XM_030721,
gen.XM_030721
Figure 5136: PRO82877
Figure 5137: DNA326506, XM_030720,
gen.XM_030720
Figure 5138: DNA326507, NM_031213,
gen.NM_031213
Figure 5139: PRO82879
Figure 5140: DNA326508, XM_039723,
gen.XM_039723
Figure 5141: DNA326509, NM_001319,
gen.NM_001319

Figure 5142: PRO82881
Figure 5143: DNA326510, NM_017797,
gen.NM_017797
Figure 5144: PRO82882
Figure 5145: DNA326511, XM_030714,
gen.XM_030714
Figure 5146: DNA256555, NM_017572,
gen.NM_017572
Figure 5147: PRO51586
Figure 5148A-B: DNA326512, NM_003938,
gen.NM_003938
Figure 5149: PRO82884
Figure 5150A-B: DNA326513, XM_046822,
gen.XM_046822
Figure 5151: PRO82885
Figure 5152: DNA326514, NM_007165,
gen.NM_007165
Figure 5153: PRO82886
Figure 5154: DNA287636, NM_004152,
gen.NM_004152
Figure 5155: DNA326515, NM_012458,
gen.NM_012458
Figure 5156: PRO82887
Figure 5157: DNA326516, NM_032737,
gen.NM_032737
Figure 5158: PRO82888
Figure 5159: DNA326517, XM_030485,
gen.XM_030485
Figure 5160: DNA326518, XM_046934,
gen.XM_046934
Figure 5161: DNA326519, NM_003021,
gen.NM_003021
Figure 5162: PRO62302
Figure 5163: DNA326520, XM_055686,
gen.XM_055686
Figure 5164: PRO37951
Figure 5165: DNA326521, XM_009222,
gen.XM_009222
Figure 5166: DNA326522, XM_052635,
gen.XM_052635
Figure 5167: PRO82892
Figure 5168: DNA326523, XM_052661,
gen.XM_052661
Figure 5169: DNA326524, NM_016263,
gen.NM_016263
Figure 5170: PRO82893
Figure 5171: DNA326525, NM_006339,
gen.NM_006339
Figure 5172: PRO82894
Figure 5173: DNA326526, NM_032753,
gen.NM_032753
Figure 5174: PRO82895
Figure 5175: DNA326527, XM_056421,
gen.XM_056421
Figure 5176A-B: DNA326528, XM_031917,
gen.XM_031917

83

Figure 5177: PRO82897
Figure 5178: DNA326529, NM_001961,
gen.NM_001961
Figure 5179: PRO62225
Figure 5180: DNA326530, XM_016871,
gen.XM_016871
Figure 5181: DNA326531, NM_016539,
gen.NM_016539
Figure 5182: PRO82899
Figure 5183: DNA326532, XM_117122,
gen.XM_117122
Figure 5184: DNA326533, XM_031857,
gen.XM_031857
Figure 5185: PRO82901
Figure 5186: DNA326534, NM_024333,
gen.NM_024333
Figure 5187: PRO82902
Figure 5188: DNA326535, NM_003025,
gen.NM_003025
Figure 5189: PRO82903
Figure 5190: DNA326536, NM_025241,
gen.NM_025241
Figure 5191: PRO82904
Figure 5192: DNA326537, XM_035638,
gen.XM_035638
Figure 5193: PRO82905
Figure 5194A-B: DNA326538, XM_035636,
gen.XM_035636
Figure 5195: DNA326539, XM_012862,
gen.XM_012862
Figure 5196A-B: DNA326540, XM_035627,
gen.XM_035627
Figure 5197A-B: DNA326541, XM_035625,
gen.XM_035625
Figure 5198: PRO82909
Figure 5199: DNA274761, NM_014649,
gen.NM_014649
Figure 5200: PRO62531
Figure 5201: DNA272421, NM_006012,
gen.NM_006012
Figure 5202: PRO60674
Figure 5203: DNA326542, NM_003685,
gen.NM_003685
Figure 5204: PRO82910
Figure 5205A-B: DNA326543, XM_009010,
gen.XM_009010
Figure 5206: DNA270315, NM_004240,
gen.NM_004240
Figure 5207: PRO58702
Figure 5208: DNA326544, NM_005490,
gen.NM_005490
Figure 5209: PRO201
Figure 5210: DNA326546, XM_044619,
gen.XM_044619
Figure 5211: PRO82912
Figure 5212: DNA326547, XM_012798,

gen.XM_012798
Figure 5213: DNA326548, XM_044608,
gen.XM_044608
Figure 5214: DNA326549, NM_003624,
gen.NM_003624
Figure 5215: PRO82915
Figure 5216: DNA326550, NM_016579,
gen.NM_016579
Figure 5217: PRO224
Figure 5218A-B: DNA326551, XM_048351,
gen.XM_048351
Figure 5219: DNA326552, XM_048364,
gen.XM_048364
Figure 5220: PRO82917
Figure 5221: DNA326553, XM_091938,
gen.XM_091938
Figure 5222: DNA326554, XM_097300,
gen.XM_097300
Figure 5223: DNA326555, XM_049282,
gen.XM_049282
Figure 5224: PRO82920
Figure 5225: DNA326556, XM_058232,
gen.XM_058232
Figure 5226: DNA326557, XM_045151,
gen.XM_045151
Figure 5227A-B: DNA326558, XM_050435,
gen.XM_050435
Figure 5228: PRO82923
Figure 5229: DNA326559, XM_113988,
gen.XM_113988
Figure 5230: DNA326560, NM_058164,
gen.NM_058164
Figure 5231: PRO82925
Figure 5232: DNA227280, NM_020230,
gen.NM_020230
Figure 5233: PRO37743
Figure 5234: DNA270621, NM_003755,
gen.NM_003755
Figure 5235: PRO58991
Figure 5236: DNA326561, XM_049502,
gen.XM_049502
Figure 5237: DNA326562, NM_007065,
gen.NM_007065
Figure 5238: PRO63226
Figure 5239: DNA326563, XM_049561,
gen.XM_049561
Figure 5240: DNA326564, XM_017204,
gen.XM_017204
Figure 5241: DNA326565, NM_005498,
gen.NM_005498
Figure 5242: PRO62112
Figure 5243: DNA326566, XM_008887,
gen.XM_008887
Figure 5244: DNA326567, XM_085862,
gen.XM_085862
Figure 5245: PRO82930

Figure 5246: DNA326568, XM_084014,
gen.XM_084014
Figure 5247A-B: DNA326569, XM_032710,
gen.XM_032710
Figure 5248: DNA326570, XM_032719,
gen.XM_032719
Figure 5249: PRO82933
Figure 5250: DNA326571, NM_024029,
gen.NM_024029
Figure 5251: PRO23794
Figure 5252: DNA326572, XM_032724,
gen.XM_032724
Figure 5253: PRO82934
Figure 5254A-B: DNA326573, NM_003072,
gen.NM_003072
Figure 5255: PRO82935
Figure 5256A-B: DNA326574, XM_009082,
gen.XM_009082
Figure 5257: DNA326575, XM_032774,
gen.XM_032774
Figure 5258: DNA218271, NM_000121,
gen.NM_000121
Figure 5259: PRO34323
Figure 5260: DNA326576, XM_057074,
gen.XM_057074
Figure 5261: DNA326577, XM_032782,
gen.XM_032782
Figure 5262: DNA326578, NM_032377,
gen.NM_032377
Figure 5263: PRO82939
Figure 5264: DNA326579, XM_015697,
gen.XM_015697
Figure 5265: PRO82940
Figure 5266: DNA326580, XM_010156,
gen.XM_010156
Figure 5267: DNA326581, NM_001930,
gen.NM_001930
Figure 5268: PRO58446
Figure 5269: DNA326582, NM_013406,
gen.NM_013406
Figure 5270: DNA326583, NM_013407,
gen.NM_013407
Figure 5271: PRO82943
Figure 5272: DNA103320, NM_002229,
gen.NM_002229
Figure 5273: PRO4650
Figure 5274: DNA326584, XM_009063,
gen.XM_009063
Figure 5275: PRO82944
Figure 5276: DNA326585, XM_085917,
gen.XM_085917
Figure 5277: DNA274034, NM_006397,
gen.NM_006397
Figure 5278: PRO61977
Figure 5279: DNA287243, NM_004461,
gen.NM_004461

Figure 5280: PRO69518
Figure 5281: DNA326586, XM_032020,
gen.XM_032020
Figure 5282: PRO2718
Figure 5283: DNA326587, NM_005053,
gen.NM_005053
Figure 5284: PRO22613
Figure 5285: DNA326588, XM_085916,
gen.XM_085916
Figure 5286: DNA326589, NM_017722,
gen.NM_017722
Figure 5287: PRO82947
Figure 5288: DNA326590, NM_003765,
gen.NM_003765
Figure 5289: PRO82948
Figure 5290: DNA326591, XM_051364,
gen.XM_051364
Figure 5291: PRO82949
Figure 5292: DNA326592, XM_031345,
gen.XM_031345
Figure 5293: PRO82950
Figure 5294: DNA326593, XM_113352,
gen.XM_113352
Figure 5295: DNA326594, XM_058967,
gen.XM_058967
Figure 5296: PRO82952
Figure 5297: DNA326595, XM_085909,
gen.XM_085909
Figure 5298: DNA269894, NM_002730,
gen.NM_002730
Figure 5299: PRO58292
Figure 5300: DNA326596, NM_018154,
gen.NM_018154
Figure 5301: PRO82954
Figure 5302: DNA326597, XM_031276,
gen.XM_031276
Figure 5303: DNA326598, XM_031273,
gen.XM_031273
Figure 5304: PRO82956
Figure 5305: DNA326599, XM_031263,
gen.XM_031263
Figure 5306: PRO82957
Figure 5307: DNA326600, XM_031251,
gen.XM_031251
Figure 5308: DNA326601, NM_006844,
gen.NM_006844
Figure 5309: PRO82958
Figure 5310A-C: DNA326602, XM_009303,
gen.XM_009303
Figure 5311: DNA326603, XM_086074,
gen.XM_086074
Figure 5312: DNA269630, NM_003290,
gen.NM_003290
Figure 5313: PRO58042
Figure 5314: DNA326604, NM_005370,
gen.NM_005370

Figure 5384: DNA326646, XM_009338, gen.XM_009338
Figure 5385: DNA326647, XM_048258, gen.XM_048258
Figure 5386: PRO82998
Figure 5387: DNA256836, NM_018468, gen.NM_018468
Figure 5388: PRO51767
Figure 5389: DNA326648, NM_024321, gen.NM_024321
Figure 5390: PRO82999
Figure 5391A-B: DNA326649, XM_049237, gen.XM_049237
Figure 5392: PRO83000
Figure 5393: DNA326650, NM_032635, gen.NM_032635
Figure 5394: PRO23845
Figure 5395: DNA326651, XM_115615, gen.XM_115615
Figure 5396A-B: DNA326652, XM_091984, gen.XM_091984
Figure 5397: PRO83002
Figure 5398: DNA326653, XM_085986, gen.XM_085986
Figure 5399: DNA326654, XM_032285, gen.XM_032285
Figure 5400: PRO83004
Figure 5401: DNA326655, NM_002812, gen.NM_002812
Figure 5402: PRO83005
Figure 5403A-E: DNA326656, XM_029455, gen.XM_029455
Figure 5404: DNA326657, XM_029450, gen.XM_029450
Figure 5405: PRO83007
Figure 5406: DNA326658, XM_009149, gen.XM_009149
Figure 5407: PRO62500
Figure 5408: DNA326659, XM_056602, gen.XM_056602
Figure 5409: DNA326660, NM_012237, gen.NM_012237
Figure 5410: PRO83008
Figure 5411: DNA326661, NM_030593, gen.NM_030593
Figure 5412: PRO83009
Figure 5413: DNA326662, NM_017827, gen.NM_017827
Figure 5414: PRO83010
Figure 5415: DNA326663, NM_021107, gen.NM_021107
Figure 5416: PRO83011
Figure 5417: DNA326664, NM_033363, gen.NM_033363
Figure 5418: PRO83012
Figure 5419: DNA326665, XM_059045,

gen.XM_059045
Figure 5420: PRO83013
Figure 5421: DNA273474, NM_005884, gen.NM_005884
Figure 5422: PRO61458
Figure 5423: DNA326666, XM_046090, gen.XM_046090
Figure 5424: PRO83014
Figure 5425: DNA326667, XM_086004, gen.XM_086004
Figure 5426: DNA272347, NM_001020, gen.NM_001020
Figure 5427: PRO60603
Figure 5428A-B: DNA326668, NM_003169, gen.NM_003169
Figure 5429: PRO12822
Figure 5430: DNA326669, XM_053074, gen.XM_053074
Figure 5431: PRO83016
Figure 5432: DNA326670, NM_016941, gen.NM_016941
Figure 5433: PRO83017
Figure 5434: DNA256840, NM_004714, gen.NM_004714
Figure 5435: PRO51771
Figure 5436: DNA326671, NM_001436, gen.NM_001436
Figure 5437: PRO83018
Figure 5438: DNA326672, XM_016410, gen.XM_016410
Figure 5439: DNA326673, XM_012860, gen.XM_012860
Figure 5440: DNA326674, XM_097365, gen.XM_097365
Figure 5441: DNA274139, NM_006503, gen.NM_006503
Figure 5442: PRO62075
Figure 5443: DNA326675, XM_009203, gen.XM_009203
Figure 5444: DNA326676, XM_047409, gen.XM_047409
Figure 5445: DNA326677, XM_047376, gen.XM_047376
Figure 5446A-B: DNA326678, XM_047374, gen.XM_047374
Figure 5447: DNA326679, XM_059052, gen.XM_059052
Figure 5448: DNA273600, NM_004596, gen.NM_004596
Figure 5449: PRO61575
Figure 5450: DNA326680, XM_030914, gen.XM_030914
Figure 5451: DNA326681, NM_052848, gen.NM_052848
Figure 5452: PRO83027
Figure 5453: DNA326682, XM_008912,

gen.XM_008912
Figure 5454: DNA326683, NM_020158, gen.NM_020158
Figure 5455: PRO83029
Figure 5456: DNA326684, XM_030901, gen.XM_030901
Figure 5457: PRO83030
Figure 5458: DNA326685, NM_018035, gen.NM_018035
Figure 5459: PRO83031
Figure 5460: DNA326686, XM_085874, gen.XM_085874
Figure 5461: DNA326687, XM_085875, gen.XM_085875
Figure 5462: DNA326688, XM_085876, gen.XM_085876
Figure 5463: DNA326689, XM_058949, gen.XM_058949
Figure 5464: PRO83035
Figure 5465: DNA326690, XM_030895, gen.XM_030895
Figure 5466: DNA326691, XM_115603, gen.XM_115603
Figure 5467: PRO83037
Figure 5468: DNA326692, NM_001022, gen.NM_001022
Figure 5469: PRO83038
Figure 5470: DNA326693, NM_004706, gen.NM_004706
Figure 5471: PRO83039
Figure 5472: DNA326694, XM_008878, gen.XM_008878
Figure 5473: PRO83040
Figure 5474: DNA326695, NM_022752, gen.NM_022752
Figure 5475: PRO83041
Figure 5476: DNA151808, NM_006494, gen.NM_006494
Figure 5477: PRO12892
Figure 5478: DNA326696, NM_001816, gen.NM_001816
Figure 5479: PRO34151
Figure 5480: DNA326697, NM_000554, gen.NM_000554
Figure 5481: PRO83042
Figure 5482: DNA326698, XM_049920, gen.XM_049920
Figure 5483: DNA326699, XM_055859, gen.XM_055859
Figure 5484A-B: DNA326700, XM_009125, gen.XM_009125
Figure 5485: DNA326701, XM_008860, gen.XM_008860
Figure 5486: DNA326702, XM_009036, gen.XM_009036
Figure 5487: DNA326703, XM_085950,

gen.XM_085950
Figure 5488: DNA326704, XM_028263, gen.XM_028263
Figure 5489: DNA326705, XM_085928, gen.XM_085928
Figure 5490: PRO36963
Figure 5491: DNA326706, XM_028267, gen.XM_028267
Figure 5492: DNA326707, NM_013403, gen.NM_013403
Figure 5493: PRO83050
Figure 5494: DNA103580, NM_001743, gen.NM_001743
Figure 5495: PRO4904
Figure 5496: DNA326708, XM_009126, gen.XM_009126
Figure 5497: DNA326709, NM_006247, gen.NM_006247
Figure 5498: PRO25881
Figure 5499: DNA326710, NM_003370, gen.NM_003370
Figure 5500: PRO83052
Figure 5501: DNA326711, XM_085856, gen.XM_085856
Figure 5502: DNA150784, NM_001983, gen.NM_001983
Figure 5503: PRO12800
Figure 5504: DNA270931, NM_012099, gen.NM_012099
Figure 5505: PRO59264
Figure 5506A-B: DNA257531, NM_031417, gen.NM_031417
Figure 5507: PRO52101
Figure 5508: DNA326712, NM_001294, gen.NM_001294
Figure 5509: PRO83054
Figure 5510: DNA326713, XM_097274, gen.XM_097274
Figure 5511: DNA88084, NM_000041, gen.NM_000041
Figure 5512: PRO2644
Figure 5513: DNA256533, NM_006114, gen.NM_006114
Figure 5514: PRO51565
Figure 5515: DNA251057, NM_002856, gen.NM_002856
Figure 5516: PRO47354
Figure 5517: DNA226011, NM_005581, gen.NM_005581
Figure 5518: PRO36474
Figure 5519: DNA326714, NM_012116, gen.NM_012116
Figure 5520: PRO83056
Figure 5521: DNA326715, XM_097275, gen.XM_097275
Figure 5522: DNA326716, XM_008851,

gen.XM_008851
Figure 5523: DNA274289, NM_016440, gen.NM_016440
Figure 5524: PRO62212
Figure 5525: DNA326717, NM_012068, gen.NM_012068
Figure 5526: PRO83059
Figure 5527: DNA326718, XM_085927, gen.XM_085927
Figure 5528: DNA326719, XM_084023, gen.XM_084023
Figure 5529: DNA326720, XM_167530, gen.XM_167530
Figure 5530: DNA326721, XM_114025, gen.XM_114025
Figure 5531: DNA326722, XM_008985, gen.XM_008985
Figure 5532: DNA326723, NM_030973, gen.NM_030973
Figure 5533: PRO83065
Figure 5534: DNA326724, NM_025129, gen.NM_025129
Figure 5535: PRO83066
Figure 5536: DNA326725, NM_014203, gen.NM_014203
Figure 5537: DNA326726, XM_085934, gen.XM_085934
Figure 5538: PRO83068
Figure 5539: DNA326727, NM_001536, gen.NM_001536
Figure 5540: PRO83069
Figure 5541: DNA326728, XM_165432, gen.XM_165432
Figure 5542: DNA274823, NM_001571, gen.NM_001571
Figure 5543: PRO62582
Figure 5544A-B: DNA326729, XM_046313, gen.XM_046313
Figure 5545: PRO83071
Figure 5546: DNA326730, NM_015953, gen.NM_015953
Figure 5547: PRO83072
Figure 5548: DNA326731, XM_027904, gen.XM_027904
Figure 5549: DNA326732, XM_084026, gen.XM_084026
Figure 5550: DNA290260, NM_012423, gen.NM_012423
Figure 5551: PRO70385
Figure 5552: DNA326733, XM_058991, gen.XM_058991
Figure 5553: PRO83073
Figure 5554: DNA326734, NM_017916, gen.NM_017916
Figure 5555: PRO83074
Figure 5556: DNA326735, NM_003598,

gen.NM_003598
Figure 5557: PRO83075
Figure 5558: DNA326736, NM_006666, gen.NM_006666
Figure 5559: PRO83076
Figure 5560: DNA326737, XM_114024, gen.XM_114024
Figure 5561: PRO83077
Figure 5562: DNA304658, NM_000146, gen.NM_000146
Figure 5563: PRO71085
Figure 5564: DNA326738, NM_004324, gen.NM_004324
Figure 5565: PRO38101
Figure 5566: DNA326739, NM_006184, gen.NM_006184
Figure 5567: PRO83078
Figure 5568: DNA273066, NM_001190, gen.NM_001190
Figure 5569: PRO61129
Figure 5570: DNA326740, XM_058987, gen.XM_058987
Figure 5571: DNA326741, NM_000979, gen.NM_000979
Figure 5572: PRO83080
Figure 5573: DNA326742, XM_085935, gen.XM_085935
Figure 5574: DNA326743, NM_031485, gen.NM_031485
Figure 5575: PRO61308
Figure 5576: DNA103239, NM_006801, gen.NM_006801
Figure 5577: PRO4569
Figure 5578: DNA326744, XM_046419, gen.XM_046419
Figure 5579: PRO83082
Figure 5580: DNA326745, NM_002691, gen.NM_002691
Figure 5581: PRO83083
Figure 5582: DNA326746, XM_056286, gen.XM_056286
Figure 5583: PRO83084
Figure 5584: DNA326747, XM_058990, gen.XM_058990
Figure 5585: PRO83085
Figure 5586: DNA326748, XM_091981, gen.XM_091981
Figure 5587: PRO83086
Figure 5588: DNA326749, NM_032712, gen.NM_032712
Figure 5589: PRO23238
Figure 5590: DNA83154, NM_001648, gen.NM_001648
Figure 5591: PRO2109
Figure 5592: DNA326750, XM_055658, gen.XM_055658

Figure 5593: DNA269481, NM_001985,
gen.NM_001985
Figure 5594: PRO57901
Figure 5595: DNA326751, XM_091886,
gen.XM_091886
Figure 5596: PRO83087
Figure 5597: DNA326752, XM_008830,
gen.XM_008830
Figure 5598: DNA326753, XM_039908,
gen.XM_039908
Figure 5599: PRO83089
Figure 5600: DNA326754, NM_015629,
gen.NM_015629
Figure 5601: PRO83090
Figure 5602: DNA326755, XM_050236,
gen.XM_050236
Figure 5603: DNA326756, XM_050589,
gen.XM_050589
Figure 5604: PRO83092
Figure 5605: DNA326757, XM_117128,
gen.XM_117128
Figure 5606: PRO83093
Figure 5607: DNA326758, XM_059321,
gen.XM_059321
Figure 5608: DNA326759, NM_003283,
gen.NM_003283
Figure 5609: PRO83095
Figure 5610A-B: DNA326760, NM_014931,
gen.NM_014931
Figure 5611: PRO83096
Figure 5612: DNA326761, XM_035919,
gen.XM_035919
Figure 5613: DNA326762, NM_000991,
gen.NM_000991
Figure 5614: PRO83098
Figure 5615: DNA273346, NM_014501,
gen.NM_014501
Figure 5616: PRO61349
Figure 5617: DNA326763, NM_013333,
gen.NM_013333
Figure 5618: PRO83099
Figure 5619: DNA326764, NM_007279,
gen.NM_007279
Figure 5620: PRO83100
Figure 5621: DNA326765, NM_016202,
gen.NM_016202
Figure 5622: PRO83101
Figure 5623: DNA326766, XM_034377,
gen.XM_034377
Figure 5624: PRO83102
Figure 5625: DNA272062, NM_014453,
gen.NM_014453
Figure 5626: PRO60333
Figure 5627: DNA254548, NM_005762,
gen.NM_005762
Figure 5628: PRO49653

Figure 5629: DNA326767, XM_085972,
gen.XM_085972
Figure 5630: PRO83103
Figure 5631: DNA326768, NM_032792,
gen.NM_032792
Figure 5632: PRO83104
Figure 5633: DNA326769, NM_001009,
gen.NM_001009
Figure 5634: PRO83105
Figure 5635: DNA326770, XM_058125,
gen.XM_058125
Figure 5636: DNA326771, NM_024691,
gen.NM_024691
Figure 5637: PRO83107
Figure 5638: DNA297288, NM_021158,
gen.NM_021158
Figure 5639: PRO70810
Figure 5640: DNA304662, NM_031229,
gen.NM_031229
Figure 5641: PRO71089
Figure 5642: DNA326772, NM_031228,
gen.NM_031228
Figure 5643: PRO83108
Figure 5644: DNA326773, XM_097749,
gen.XM_097749
Figure 5645: PRO83109
Figure 5646: DNA326774, XM_055993,
gen.XM_055993
Figure 5647: DNA326775, XM_009622,
gen.XM_009622
Figure 5648: DNA326776, NM_000801,
gen.NM_000801
Figure 5649: PRO59142
Figure 5650: DNA326777, NM_054014,
gen.NM_054014
Figure 5651: PRO59142
Figure 5652: DNA326778, NM_016143,
gen.NM_016143
Figure 5653: PRO83112
Figure 5654: DNA287270, NM_003091,
gen.NM_003091
Figure 5655: PRO69541
Figure 5656: DNA326779, NM_052881,
gen.NM_052881
Figure 5657: PRO83113
Figure 5658: DNA326780, XM_044914,
gen.XM_044914
Figure 5659: PRO83114
Figure 5660: DNA326781, XM_044915,
gen.XM_044915
Figure 5661: DNA326782, NM_006899,
gen.NM_006899
Figure 5662: PRO83116
Figure 5663: DNA326783, NM_019609,
gen.NM_019609
Figure 5664: PRO83117

Figure 5665: DNA326784, NM_021826,
gen.NM_021826
Figure 5666: PRO83118
Figure 5667: DNA326785, XM_045418,
gen.XM_045418
Figure 5668: DNA287261, NM_017874,
gen.NM_017874
Figure 5669: PRO69533
Figure 5670: DNA326786, XM_086710,
gen.XM_086710
Figure 5671: DNA326787, XM_045451,
gen.XM_045451
Figure 5672: PRO83121
Figure 5673: DNA326788, XM_114174,
gen.XM_114174
Figure 5674: DNA326789, XM_045460,
gen.XM_045460
Figure 5675: DNA326790, XM_059268,
gen.XM_059268
Figure 5676A-B: DNA271010, NM_014737,
gen.NM_014737
Figure 5677: PRO59339
Figure 5678: DNA326791, XM_056035,
gen.XM_056035
Figure 5679: DNA83170, NM_001819,
gen.NM_001819
Figure 5680: PRO2615
Figure 5681: DNA227348, NM_019095,
gen.NM_019095
Figure 5682: PRO37811
Figure 5683: DNA326792, NM_003092,
gen.NM_003092
Figure 5684: PRO83125
Figure 5685: DNA287290, NM_014426,
gen.NM_014426
Figure 5686: PRO69560
Figure 5687: DNA326793, XM_086701,
gen.XM_086701
Figure 5688: DNA326794, XM_117209,
gen.XM_117209
Figure 5689A-B: DNA326795, XM_046520,
gen.XM_046520
Figure 5690: PRO83128
Figure 5691: DNA326796, XM_115846,
gen.XM_115846
Figure 5692: PRO83129
Figure 5693: DNA326797, NM_080820,
gen.NM_080820
Figure 5694: PRO83130
Figure 5695: DNA326798, XM_086715,
gen.XM_086715
Figure 5696: DNA326799, XM_092760,
gen.XM_092760
Figure 5697: PRO83132
Figure 5698: DNA326800, NM_012255,
gen.NM_012255

Figure 5699: PRO83133
Figure 5700: DNA326801, XM_012970,
gen.XM_012970
Figure 5701: DNA326802, XM_042765,
gen.XM_042765
Figure 5702: PRO83135
Figure 5703: DNA150548, NM_001247,
gen.NM_001247
Figure 5704: PRO12324
Figure 5705A-B: DNA326803, XM_009436,
gen.XM_009436
Figure 5706: DNA326804, XM_114178,
gen.XM_114178
Figure 5707: PRO83137
Figure 5708: DNA326805, XM_046160,
gen.XM_046160
Figure 5709: PRO83138
Figure 5710: DNA326806, XM_046179,
gen.XM_046179
Figure 5711: PRO83139
Figure 5712: DNA326807, XM_086745,
gen.XM_086745
Figure 5713: DNA326808, NM_138578,
gen.NM_138578
Figure 5714: PRO83141
Figure 5715: DNA326809, NM_012112,
gen.NM_012112
Figure 5716: PRO83142
Figure 5717: DNA326810, XM_086736,
gen.XM_086736
Figure 5718: PRO83143
Figure 5719: DNA326811, NM_030815,
gen.NM_030815
Figure 5720: PRO83144
Figure 5721A-B: DNA150767, NM_014742,
gen.NM_014742
Figure 5722: PRO12460
Figure 5723A-B: DNA326812, XM_047007,
gen.XM_047007
Figure 5724: PRO83145
Figure 5725A-B: DNA326813, XM_047011,
gen.XM_047011
Figure 5726: PRO83146
Figure 5727A-B: DNA326814, XM_047018,
gen.XM_047018
Figure 5728: DNA326815, XM_009450,
gen.XM_009450
Figure 5729: DNA326816, NM_033197,
gen.NM_033197
Figure 5730: PRO83149
Figure 5731: DNA326817, XM_097772,
gen.XM_097772
Figure 5732: PRO83150
Figure 5733: DNA326818, NM_016732,
gen.NM_016732
Figure 5734: DNA97298, NM_003908,

gen.NM_003908
Figure 5735: PRO3645
Figure 5736: DNA326819, NM_000687,
gen.NM_000687
Figure 5737: PRO83152
Figure 5738: DNA273517, NM_000178,
gen.NM_000178
Figure 5739: PRO61498
Figure 5740: DNA326820, NM_018217,
gen.NM_018217
Figure 5741: PRO83153
Figure 5742: DNA326821, NM_002212,
gen.NM_002212
Figure 5743: PRO60945
Figure 5744A-C: DNA326822, NM_007186,
gen.NM_007186
Figure 5745: DNA226758, NM_015966,
gen.NM_015966
Figure 5746: PRO37221
Figure 5747: DNA194701, NM_003915,
gen.NM_003915
Figure 5748: PRO24002
Figure 5749: DNA326823, XM_113380,
gen.XM_113380
Figure 5750: DNA326824, NM_016558,
gen.NM_016558
Figure 5751: PRO83155
Figure 5752: DNA326825, NM_015511,
gen.NM_015511
Figure 5753: PRO83156
Figure 5754: DNA326826, XM_009501,
gen.XM_009501
Figure 5755: PRO83157
Figure 5756: DNA326827, XM_057236,
gen.XM_057236
Figure 5757: DNA326828, NM_024918,
gen.NM_024918
Figure 5758: PRO83159
Figure 5759: DNA326829, XM_009642,
gen.XM_009642
Figure 5760: DNA194807, NM_006698,
gen.NM_006698
Figure 5761: PRO24077
Figure 5762: DNA326830, XM_009686,
gen.XM_009686
Figure 5763: DNA326831, NM_030877,
gen.NM_030877
Figure 5764: PRO83161
Figure 5765: DNA326832, XM_028806,
gen.XM_028806
Figure 5766A-B: DNA326833, XM_028810,
gen.XM_028810
Figure 5767: PRO83163
Figure 5768: DNA326834, XM_012931,
gen.XM_012931
Figure 5769: DNA326835, NM_024855,

gen.NM_024855
Figure 5770: PRO83165
Figure 5771A-B: DNA227472, NM_002660,
gen.NM_002660
Figure 5772: PRO37935
Figure 5773: DNA326836, XM_097727,
gen.XM_097727
Figure 5774: DNA103525, NM_002466,
gen.NM_002466
Figure 5775: PRO4852
Figure 5776: DNA326837, XM_029810,
gen.XM_029810
Figure 5777: PRO83167
Figure 5778: DNA326838, XM_029822,
gen.XM_029822
Figure 5779: DNA326839, NM_002638,
gen.NM_002638
Figure 5780: PRO2065
Figure 5781: DNA326840, NM_003064,
gen.NM_003064
Figure 5782: PRO1720
Figure 5783: DNA326841, NM_015937,
gen.NM_015937
Figure 5784: PRO83169
Figure 5785: DNA273320, NM_007019,
gen.NM_007019
Figure 5786: PRO61327
Figure 5787: DNA326842, NM_033421,
gen.NM_033421
Figure 5788: PRO83170
Figure 5789: DNA88569, NM_006227,
gen.NM_006227
Figure 5790: PRO2420
Figure 5791: DNA88239, NM_004994,
gen.NM_004994
Figure 5792: PRO2711
Figure 5793: DNA326843, XM_057374,
gen.XM_057374
Figure 5794: DNA326844, XM_114163,
gen.XM_114163
Figure 5795A-B: DNA326845, XM_097731,
gen.XM_097731
Figure 5796A-B: DNA326846, XM_030044,
gen.XM_030044
Figure 5797: PRO83174
Figure 5798: DNA326847, NM_017895,
gen.NM_017895
Figure 5799: PRO83175
Figure 5800: DNA326848, XM_097713,
gen.XM_097713
Figure 5801: PRO83176
Figure 5802: DNA326849, NM_005985,
gen.NM_005985
Figure 5803: PRO83177
Figure 5804: DNA326850, NM_003349,
gen.NM_003349

Figure 5805: PRO83178
Figure 5806: DNA326851, NM_022442,
gen.NM_022442
Figure 5807: PRO83179
Figure 5808: DNA326852, NM_005194,
gen.NM_005194
Figure 5809: DNA326853, NM_002827,
gen.NM_002827
Figure 5810: PRO38066
Figure 5811: DNA326854, NM_003859,
gen.NM_003859
Figure 5812: PRO83180
Figure 5813: DNA326855, XM_114165,
gen.XM_114165
Figure 5814: DNA269526, NM_001324,
gen.NM_001324
Figure 5815: PRO57942
Figure 5816: DNA326856, XM_009549,
gen.XM_009549
Figure 5817: PRO83182
Figure 5818: DNA326857, XM_030621,
gen.XM_030621
Figure 5819: DNA326858, XM_086648,
gen.XM_086648
Figure 5820: PRO83183
Figure 5821: DNA326859, XM_009672,
gen.XM_009672
Figure 5822: PRO83184
Figure 5823A-B: DNA326860, XM_009671,
gen.XM_009671
Figure 5824: DNA326861, NM_004738,
gen.NM_004738
Figure 5825: PRO983
Figure 5826: DNA326862, NM_016592,
gen.NM_016592
Figure 5827: PRO83185
Figure 5828: DNA326863, NM_080425,
gen.NM_080425
Figure 5829: PRO83186
Figure 5830: DNA304670, NM_000516,
gen.NM_000516
Figure 5831: PRO71097
Figure 5832: DNA326864, NM_080426,
gen.NM_080426
Figure 5833: PRO83187
Figure 5834: DNA326865, XM_030699,
gen.XM_030699
Figure 5835: PRO83188
Figure 5836: DNA188229, NM_000114,
gen.NM_000114
Figure 5837: PRO21728
Figure 5838: DNA326866, NM_002792,
gen.NM_002792
Figure 5839: PRO83189
Figure 5840A-B: DNA326867, XM_037202,
gen.XM_037202

Figure 5841: PRO83190
Figure 5842: DNA326868, XM_037206,
gen.XM_037206
Figure 5843: PRO83191
Figure 5844: DNA103486, NM_007002,
gen.NM_007002
Figure 5845: PRO4813
Figure 5846A-D: DNA326869, XM_037217,
gen.XM_037217
Figure 5847: DNA326870, NM_001024,
gen.NM_001024
Figure 5848: PRO83193
Figure 5849: DNA326871, NM_018270,
gen.NM_018270
Figure 5850: PRO83194
Figure 5851: DNA326872, XM_028783,
gen.XM_028783
Figure 5852: PRO83195
Figure 5853: DNA326873, NM_001853,
gen.NM_001853
Figure 5854: PRO83196
Figure 5855: DNA326874, NM_080796,
gen.NM_080796
Figure 5856: PRO83197
Figure 5857: DNA326875, NM_022105,
gen.NM_022105
Figure 5858: PRO83198
Figure 5859: DNA326876, NM_080797,
gen.NM_080797
Figure 5860: PRO83199
Figure 5861: DNA326877, NM_018209,
gen.NM_018209
Figure 5862: PRO83200
Figure 5863A-C: DNA326878, XM_028834,
gen.XM_028834
Figure 5864: PRO83201
Figure 5865: DNA326879, NM_024299,
gen.NM_024299
Figure 5866: PRO83202
Figure 5867A-C: DNA326880, XM_028918,
gen.XM_028918
Figure 5868: PRO83203
Figure 5869: DNA326881, NM_032527,
gen.NM_032527
Figure 5870: PRO83204
Figure 5871A-B: DNA326882, XM_028966,
gen.XM_028966
Figure 5872: PRO83205
Figure 5873: DNA269746, NM_012469,
gen.NM_012469
Figure 5874: PRO58155
Figure 5875: DNA326883, XM_114154,
gen.XM_114154
Figure 5876: DNA326884, XM_072173,
gen.XM_072173
Figure 5877: DNA326885, XM_086759,

gen.XM_086759
Figure 5878: DNA326886, XM_086760,
gen.XM_086760
Figure 5879: DNA326887, NM_021219,
gen.NM_021219
Figure 5880: PRO28687
Figure 5881: DNA188732, NM_000484,
gen.NM_000484
Figure 5882: PRO25302
Figure 5883: DNA326888, NM_016940,
gen.NM_016940
Figure 5884: PRO83210
Figure 5885: DNA254572, NM_006585,
gen.NM_006585
Figure 5886: PRO49675
Figure 5887: DNA326889, NM_005806,
gen.NM_005806
Figure 5888: PRO83211
Figure 5889: DNA326890, XM_114185,
gen.XM_114185
Figure 5890: DNA254994, NM_017613,
gen.NM_017613
Figure 5891: PRO50083
Figure 5892: DNA274129, NM_001697,
gen.NM_001697
Figure 5893: PRO62065
Figure 5894: DNA326891, NM_001757,
gen.NM_001757
Figure 5895: PRO83212
Figure 5896A-C: DNA151898, NM_003316,
gen.NM_003316
Figure 5897: PRO12135
Figure 5898: DNA326892, NM_003720,
gen.NM_003720
Figure 5899: PRO83213
Figure 5900: DNA326893, NM_002606,
gen.NM_002606
Figure 5901: PRO83214
Figure 5902: DNA326894, XM_033015,
gen.XM_033015
Figure 5903: DNA326895, XM_033016,
gen.XM_033016
Figure 5904: PRO59669
Figure 5905: DNA326896, NM_003681,
gen.NM_003681
Figure 5906: PRO69486
Figure 5907: DNA326897, XM_035999,
gen.XM_035999
Figure 5908: DNA326898, NM_020132,
gen.NM_020132
Figure 5909: PRO83217
Figure 5910: DNA326899, XM_036011,
gen.XM_036011
Figure 5911: DNA326900, NM_013369,
gen.NM_013369
Figure 5912: PRO83219

Figure 5913: DNA326901, XM_036042,
gen.XM_036042
Figure 5914: DNA326902, XM_086770,
gen.XM_086770
Figure 5915: DNA326903, NM_004928,
gen.NM_004928
Figure 5916: PRO83222
Figure 5917: DNA326904, XM_036087,
gen.XM_036087
Figure 5918: PRO83223
Figure 5919: DNA326905, XM_009805,
gen.XM_009805
Figure 5920: PRO83224
Figure 5921: DNA226409, NM_004339,
gen.NM_004339
Figure 5922: PRO36872
Figure 5923: DNA326906, XM_036107,
gen.XM_036107
Figure 5924A-B: DNA326907, XM_036175,
gen.XM_036175
Figure 5925: DNA326908, XM_097817,
gen.XM_097817
Figure 5926A-B: DNA326909, XM_054566,
gen.XM_054566
Figure 5927: DNA326910, XM_036755,
gen.XM_036755
Figure 5928: DNA326911, XM_086773,
gen.XM_086773
Figure 5929: DNA326912, XM_097807,
gen.XM_097807
Figure 5930: DNA326913, XM_086777,
gen.XM_086777
Figure 5931: DNA326914, NM_002340,
gen.NM_002340
Figure 5932: PRO83233
Figure 5933A-B: DNA326915, NM_003906,
gen.NM_003906
Figure 5934: PRO83234
Figure 5935: DNA226617, NM_006272,
gen.NM_006272
Figure 5936: PRO37080
Figure 5937: DNA326916, NM_033070,
gen.NM_033070
Figure 5938: PRO83235
Figure 5939: DNA255046, NM_017829,
gen.NM_017829
Figure 5940: PRO50134
Figure 5941: DNA326917, NM_001696,
gen.NM_001696
Figure 5942: PRO83236
Figure 5943A-B: DNA326918, XM_032996,
gen.XM_032996
Figure 5944: PRO83237
Figure 5945: DNA326919, XM_167538,
gen.XM_167538
Figure 5946: DNA326920, XM_033090,

gen.XM_033090
Figure 5947: DNA225954, NM_000407,
gen.NM_000407
Figure 5948: PRO36417
Figure 5949: DNA326921, XM_058918,
gen.XM_058918
Figure 5950: DNA326922, XM_097833,
gen.XM_097833
Figure 5951: DNA326923, NM_024627,
gen.NM_024627
Figure 5952: PRO83242
Figure 5953: DNA326924, XM_086809,
gen.XM_086809
Figure 5954: DNA326925, NM_006440,
gen.NM_006440
Figure 5955: PRO83244
Figure 5956: DNA226561, NM_000754,
gen.NM_000754
Figure 5957: PRO37024
Figure 5958: DNA326926, NM_007310,
gen.NM_007310
Figure 5959: PRO83245
Figure 5960A-B: DNA326927, XM_033813,
gen.XM_033813
Figure 5961: DNA326928, NM_022727,
gen.NM_022727
Figure 5962: PRO83247
Figure 5963: DNA326929, XM_086805,
gen.XM_086805
Figure 5964: DNA326930, XM_086873,
gen.XM_086873
Figure 5965: DNA257549, NM_030573,
gen.NM_030573
Figure 5966: PRO52119
Figure 5967: DNA326931, XM_096155,
gen.XM_096155
Figure 5968: DNA326932, XM_096156,
gen.XM_096156
Figure 5969A-B: DNA326933, XM_036937,
gen.XM_036937
Figure 5970: PRO83252
Figure 5971: DNA326934, XM_097886,
gen.XM_097886
Figure 5972: PRO83253
Figure 5973: DNA304835, NM_022044,
gen.NM_022044
Figure 5974: PRO71242
Figure 5975: DNA326935, NM_006115,
gen.NM_006115
Figure 5976: PRO37012
Figure 5977: DNA326936, XM_037682,
gen.XM_037682
Figure 5978: PRO83254
Figure 5979: DNA326937, NM_002415,
gen.NM_002415
Figure 5980: PRO83255

Figure 5981A-B: DNA326938, XM_037797,
gen.XM_037797
Figure 5982: PRO83256
Figure 5983: DNA326939, NM_004175,
gen.NM_004175
Figure 5984: PRO83257
Figure 5985: DNA326940, XM_086821,
gen.XM_086821
Figure 5986: DNA326941, XM_092888,
gen.XM_092888
Figure 5987: DNA326942, NM_005080,
gen.NM_005080
Figure 5988: PRO83260
Figure 5989: DNA269830, NM_005243,
gen.NM_005243
Figure 5990: PRO58232
Figure 5991: DNA326943, NM_006478,
gen.NM_006478
Figure 5992: PRO83261
Figure 5993A-B: DNA326944, XM_037945,
gen.XM_037945
Figure 5994: DNA103462, NM_000268,
gen.NM_000268
Figure 5995: PRO4789
Figure 5996: DNA326945, NM_032204,
gen.NM_032204
Figure 5997: PRO83263
Figure 5998: DNA326946, XM_066291,
gen.XM_066291
Figure 5999: DNA326947, NM_005877,
gen.NM_005877
Figure 6000: PRO62328
Figure 6001: DNA326948, NM_016498,
gen.NM_016498
Figure 6002: PRO83265
Figure 6003: DNA254141, NM_014303,
gen.NM_014303
Figure 6004: PRO49256
Figure 6005A-B: DNA151882, NM_014941,
gen.NM_014941
Figure 6006: PRO12134
Figure 6007: DNA326949, NM_006932,
gen.NM_006932
Figure 6008: PRO83266
Figure 6009: DNA326950, NM_134269,
gen.NM_134269
Figure 6010: PRO83267
Figure 6011: DNA270697, NM_004147,
gen.NM_004147
Figure 6012: PRO59061
Figure 6013: DNA326951, XM_059335,
gen.XM_059335
Figure 6014: DNA326952, XM_018539,
gen.XM_018539
Figure 6015: DNA326953, NM_014306,
gen.NM_014306

95

gen.XM_010024
Figure 6088: DNA326987, XM_040066, gen.XM_040066
Figure 6089: DNA326988, XM_013015, gen.XM_013015
Figure 6090A-B: DNA326989, XM_084084, gen.XM_084084
Figure 6091: DNA326990, XM_040095, gen.XM_040095
Figure 6092: PRO83297
Figure 6093: DNA326991, XM_086875, gen.XM_086875
Figure 6094: DNA326992, XM_010029, gen.XM_010029
Figure 6095: DNA326993, NM_007311, gen.NM_007311
Figure 6096: PRO83300
Figure 6097: DNA326994, NM_015140, gen.NM_015140
Figure 6098: PRO83301
Figure 6099: DNA326995, XM_043614, gen.XM_043614
Figure 6100: PRO83302
Figure 6101: DNA256070, NM_022141, gen.NM_022141
Figure 6102: PRO51119
Figure 6103: DNA326996, XM_010040, gen.XM_010040
Figure 6104: DNA237931, NM_005036, gen.NM_005036
Figure 6105: PRO39030
Figure 6106A-B: DNA326997, XM_027143, gen.XM_027143
Figure 6107: PRO83304
Figure 6108A-B: DNA326998, XM_010055, gen.XM_010055
Figure 6109: DNA326999, NM_025204, gen.NM_025204
Figure 6110: PRO83306
Figure 6111: DNA327000, XM_041248, gen.XM_041248
Figure 6112: PRO83307
Figure 6113: DNA327001, XM_092966, gen.XM_092966
Figure 6114: DNA327002, XM_037468, gen.XM_037468
Figure 6115: PRO83309
Figure 6116: DNA327003, XM_037474, gen.XM_037474
Figure 6117: PRO83310
Figure 6118: DNA327004, XM_013029, gen.XM_013029
Figure 6119: DNA327005, XM_114724, gen.XM_114724
Figure 6120: PRO83312
Figure 6121: DNA327006, XM_115924,

gen.XM_115924
Figure 6122: DNA327007, XM_113585, gen.XM_113585
Figure 6123A-C: DNA327008, XM_035465, gen.XM_035465
Figure 6124: DNA327009, NM_002414, gen.NM_002414
Figure 6125: PRO2373
Figure 6126: DNA269793, NM_005333, gen.NM_005333
Figure 6127: PRO58198
Figure 6128: DNA327010, XM_088747, gen.XM_088747
Figure 6129: PRO83316
Figure 6130: DNA327011, XM_114720, gen.XM_114720
Figure 6131: DNA327012, XM_115886, gen.XM_115886
Figure 6132: DNA327013, XM_010272, gen.XM_010272
Figure 6133: PRO83319
Figure 6134: DNA327014, NM_006746, gen.NM_006746
Figure 6135: PRO83320
Figure 6136: DNA327015, XM_115890, gen.XM_115890
Figure 6137: PRO83321
Figure 6138: DNA327016, NM_000284, gen.NM_000284
Figure 6139: PRO59441
Figure 6140: DNA327017, NM_004595, gen.NM_004595
Figure 6141: PRO61744
Figure 6142: DNA327018, XM_166078, gen.XM_166078
Figure 6143: DNA327019, NM_001415, gen.NM_001415
Figure 6144: PRO83323
Figure 6145: DNA327020, XM_013086, gen.XM_013086
Figure 6146: DNA327021, XM_060030, gen.XM_060030
Figure 6147: DNA227689, NM_002364, gen.NM_002364
Figure 6148: PRO38152
Figure 6149: DNA274829, NM_003662, gen.NM_003662
Figure 6150: PRO62588
Figure 6151: DNA327022, XM_088619, gen.XM_088619
Figure 6152: DNA327023, XM_088622, gen.XM_088622
Figure 6153A-B: DNA327024, XM_084288, gen.XM_084288
Figure 6154: PRO59168
Figure 6155: DNA327025, XM_054221,

gen.XM_054221
Figure 6156: PRO83328
Figure 6157: DNA327026, XM_018019,
gen.XM_018019
Figure 6158: DNA327027, XM_088665,
gen.XM_088665
Figure 6159: DNA327028, NM_005300,
gen.NM_005300
Figure 6160: PRO37083
Figure 6161: DNA327029, XM_018241,
gen.XM_018241
Figure 6162: PRO83331
Figure 6163: DNA327030, NM_014138,
gen.NM_014138
Figure 6164: PRO83332
Figure 6165: DNA327031, NM_005676,
gen.NM_005676
Figure 6166: PRO83333
Figure 6167: DNA327032, NM_003334,
gen.NM_003334
Figure 6168: PRO83334
Figure 6169: DNA327033, XM_010378,
gen.XM_010378
Figure 6170: DNA327034, XM_033884,
gen.XM_033884
Figure 6171: PRO83335
Figure 6172: DNA327035, XM_033878,
gen.XM_033878
Figure 6173: DNA327036, XM_033862,
gen.XM_033862
Figure 6174: DNA327037, NM_004182,
gen.NM_004182
Figure 6175: PRO83337
Figure 6176: DNA327038, XM_047032,
gen.XM_047032
Figure 6177: DNA327039, XM_047024,
gen.XM_047024
Figure 6178: PRO83339
Figure 6179: DNA327040, NM_017883,
gen.NM_017883
Figure 6180: PRO83340
Figure 6181: DNA238039, NM_005710,
gen.NM_005710
Figure 6182: PRO39127
Figure 6183: DNA327041, XM_054098,
gen.XM_054098
Figure 6184: PRO83341
Figure 6185: DNA327042, NM_002668,
gen.NM_002668
Figure 6186: PRO34584
Figure 6187: DNA271580, NM_014008,
gen.NM_014008
Figure 6188: PRO59868
Figure 6189A-B: DNA327043, XM_032930,
gen.XM_032930
Figure 6190: DNA273992, NM_004493,

gen.NM_004493
Figure 6191: PRO61938
Figure 6192A-B: DNA327044, XM_050403,
gen.XM_050403
Figure 6193: PRO83343
Figure 6194: DNA327045, XM_029187,
gen.XM_029187
Figure 6195: PRO83344
Figure 6196: DNA327046, XM_013060,
gen.XM_013060
Figure 6197: DNA227943, NM_006787,
gen.NM_006787
Figure 6198: PRO38406
Figure 6199: DNA327047, NM_014481,
gen.NM_014481
Figure 6200: PRO83345
Figure 6201: DNA327048, XM_034935,
gen.XM_034935
Figure 6202: PRO83346
Figure 6203: DNA327049, XM_084287,
gen.XM_084287
Figure 6204: DNA327050, NM_007268,
gen.NM_007268
Figure 6205: PRO34043
Figure 6206: DNA327051, XM_015516,
gen.XM_015516
Figure 6207A-B: DNA327052, XM_013042,
gen.XM_013042
Figure 6208: PRO83349
Figure 6209: DNA327053, XM_088630,
gen.XM_088630
Figure 6210: DNA327054, NM_031206,
gen.NM_031206
Figure 6211: PRO83351
Figure 6212: DNA327055, XM_093050,
gen.XM_093050
Figure 6213: PRO83352
Figure 6214A-B: DNA225721, NM_018977,
gen.NM_018977
Figure 6215: PRO36184
Figure 6216: DNA327056, XM_010141,
gen.XM_010141
Figure 6217: PRO38021
Figure 6218: DNA327057, XM_088689,
gen.XM_088689
Figure 6219: PRO83353
Figure 6220: DNA327058, XM_088688,
gen.XM_088688
Figure 6221: PRO83354
Figure 6222: DNA327059, NM_018486,
gen.NM_018486
Figure 6223: PRO83355
Figure 6224: DNA327060, NM_001007,
gen.NM_001007
Figure 6225: PRO42022
Figure 6226: DNA327061, XM_093130,

gen.XM_093130
Figure 6227: DNA327062, XM_084296, gen.XM_084296
Figure 6228: DNA327063, XM_093241, gen.XM_093241
Figure 6229: DNA327064, XM_084283, gen.XM_084283
Figure 6230: DNA273254, NM_000291, gen.NM_000291
Figure 6231: PRO61271
Figure 6232: DNA327065, XM_018142, gen.XM_018142
Figure 6233: DNA327066, XM_030373, gen.XM_030373
Figure 6234: PRO83360
Figure 6235: DNA327067, XM_165533, gen.XM_165533
Figure 6236: PRO83361
Figure 6237: DNA327068, XM_051476, gen.XM_051476
Figure 6238: DNA327069, XM_051471, gen.XM_051471
Figure 6239: DNA270496, NM_001325, gen.NM_001325
Figure 6240: PRO58875
Figure 6241: DNA327070, XM_033147, gen.XM_033147
Figure 6242: DNA327071, NM_004085, gen.NM_004085
Figure 6243: PRO59022
Figure 6244: DNA327072, NM_021029, gen.NM_021029
Figure 6245: PRO10723
Figure 6246: DNA327073, NM_012286, gen.NM_012286
Figure 6247: PRO83365
Figure 6248: DNA327074, NM_024863, gen.NM_024863
Figure 6249: PRO83366
Figure 6250: DNA327075, XM_043643, gen.XM_043643
Figure 6251: DNA327076, NM_052936, gen.NM_052936
Figure 6252: PRO83368
Figure 6253: DNA327077, XM_088710, gen.XM_088710
Figure 6254: PRO83369
Figure 6255: DNA327078, XM_166081, gen.XM_166081
Figure 6256: DNA327079, XM_096303, gen.XM_096303
Figure 6257: DNA254785, NM_032227, gen.NM_032227
Figure 6258: PRO49883
Figure 6259: DNA327080, XM_115923, gen.XM_115923

Figure 6260: PRO83372
Figure 6261: DNA327081, XM_066900, gen.XM_066900
Figure 6262: PRO83373
Figure 6263: DNA327082, XM_104983, gen.XM_104983
Figure 6264: PRO83374
Figure 6265: DNA327083, XM_088736, gen.XM_088736
Figure 6266: PRO83375
Figure 6267: DNA327084, XM_088738, gen.XM_088738
Figure 6268: DNA327085, XM_088739, gen.XM_088739
Figure 6269: DNA327086, XM_010117, gen.XM_010117
Figure 6270A-B: DNA76504, NM_001560, gen.NM_001560
Figure 6271: PRO2537
Figure 6272: DNA227181, NM_006667, gen.NM_006667
Figure 6273: PRO37644
Figure 6274: DNA327087, XM_010362, gen.XM_010362
Figure 6275: DNA327088, XM_016125, gen.XM_016125
Figure 6276: DNA327089, NM_015129, gen.NM_015129
Figure 6277: PRO83381
Figure 6278: DNA327090, NM_001000, gen.NM_001000
Figure 6279: PRO10935
Figure 6280: DNA327091, XM_010436, gen.XM_010436
Figure 6281: DNA327092, XM_115874, gen.XM_115874
Figure 6282: DNA327093, XM_029461, gen.XM_029461
Figure 6283: PRO83383
Figure 6284: DNA327094, XM_017930, gen.XM_017930
Figure 6285: DNA227656, NM_004208, gen.NM_004208
Figure 6286: PRO38119
Figure 6287: DNA273487, NM_004794, gen.NM_004794
Figure 6288: PRO61470
Figure 6289: DNA327095, XM_088745, gen.XM_088745
Figure 6290: PRO83385
Figure 6291: DNA327096, XM_114708, gen.XM_114708
Figure 6292: PRO83386
Figure 6293: DNA327097, NM_016267, gen.NM_016267
Figure 6294: PRO83387

Figure 6295A-B: DNA327098, XM_042963, gen.XM_042963
Figure 6296: PRO83388
Figure 6297: DNA327099, XM_042968, gen.XM_042968
Figure 6298: PRO83389
Figure 6299: DNA327100, XM_093219, gen.XM_093219
Figure 6300: DNA327101, NM_016249, gen.NM_016249
Figure 6301: PRO83391
Figure 6302: DNA327102, XM_098995, gen.XM_098995
Figure 6303: PRO83392
Figure 6304: DNA327103, XM_041921, gen.XM_041921
Figure 6305: PRO83393
Figure 6306: DNA327104, XM_048905, gen.XM_048905
Figure 6307: PRO83394
Figure 6308: DNA327105, NM_005364, gen.NM_005364
Figure 6309: PRO83395
Figure 6310: DNA327106, XM_010178, gen.XM_010178
Figure 6311: DNA327107, XM_088592, gen.XM_088592
Figure 6312: PRO25245
Figure 6313: DNA327108, XM_018108, gen.XM_018108
Figure 6314: PRO83397
Figure 6315: DNA327109, XM_018109, gen.XM_018109
Figure 6316: DNA327110, NM_005362, gen.NM_005362
Figure 6317: PRO24021
Figure 6318: DNA254783, NM_001363, gen.NM_001363
Figure 6319: PRO49881
Figure 6320: DNA327111, XM_049337, gen.XM_049337
Figure 6321: DNA227917, NM_019848, gen.NM_019848
Figure 6322: PRO38380
Figure 6323: DNA327112, NM_004699, gen.NM_004699
Figure 6324: PRO83400
Figure 6325: DNA327113, XM_048420, gen.XM_048420
Figure 6326: DNA327114, NM_006013,

gen.NM_006013
Figure 6327: PRO62466
Figure 6328: DNA327115, XM_048410, gen.XM_048410
Figure 6329A-C: DNA327116, XM_048404, gen.XM_048404
Figure 6330A-C: DNA327117, NM_004992, gen.NM_004992
Figure 6331: PRO83403
Figure 6332: DNA227013, NM_001569, gen.NM_001569
Figure 6333: PRO37476
Figure 6334A-B: DNA225800, NM_000425, gen.NM_000425
Figure 6335: PRO36263
Figure 6336A-B: DNA327118, NM_024003, gen.NM_024003
Figure 6337: PRO83404
Figure 6338: DNA225655, NM_006280, gen.NM_006280
Figure 6339: PRO36118
Figure 6340: DNA276159, NM_004135, gen.NM_004135
Figure 6341: PRO63299
Figure 6342A-B: DNA230792, NM_000033, gen.NM_000033
Figure 6343: PRO38730
Figure 6344: DNA103558, NM_005745, gen.NM_005745
Figure 6345: PRO4885
Figure 6346: DNA327119, XM_042155, gen.XM_042155
Figure 6347: PRO83405
Figure 6348: DNA327120, XM_042153, gen.XM_042153
Figure 6349: DNA327121, XM_117555, gen.XM_117555
Figure 6350: DNA327122, XM_084311, gen.XM_084311
Figure 6351: DNA327123, XM_033232, gen.XM_033232
Figure 6352: DNA327124, XM_117539, gen.XM_117539
Figure 6353: DNA327125, XM_027952, gen.XM_027952
Figure 6354: DNA327126, XM_114692, gen.XM_114692
Figure 6355A-B: DNA327127, XM_165530, gen.XM_165530

DNA Index (to Figure number)

DNA226080, 3206
DNA226105, 3992
DNA226125, 409
DNA226217, 3004
DNA226260, 271
DNA226262, 105
DNA226324, 4095
DNA226337, 2458
DNA226345, 2670
DNA226389, 4820
DNA226409, 5921
DNA226416, 2262
DNA226418, 1791
DNA226428, 741
DNA226496, 2565
DNA226547, 1108
DNA226560, 2393
DNA226561, 5956
DNA226617, 5935
DNA226619, 474
DNA226646, 4224
DNA226758, 5745
DNA226771, 3498
DNA226793, 436
DNA226853, 3866
DNA226872, 1689
DNA227013, 6332
DNA227055, 4939
DNA227071, 4889
DNA227084, 4742
DNA227088, 3220
DNA227092, 3593
DNA227094, 3628
DNA227165, 684
DNA227171, 3724
DNA227172, 2964
DNA227173, 1573
DNA227181, 6272
DNA227190, 814
DNA227191, 3588
DNA227204, 1886
DNA227206, 4170
DNA227213, 157
DNA227234, 4626
DNA227246, 550
DNA227249, 5352
DNA227267, 2512
DNA227268, 2242
DNA227280, 5232
DNA227307, 1165
DNA227320, 1812
DNA227321, 3984
DNA227348, 5681
DNA227442, 1942
DNA227472, 5771
DNA227474, 3720

DNA227491, 2691
DNA227504, 594
DNA227509, 3076
DNA227528, 803
DNA227529, 346
DNA227545, 698
DNA227559, 4161
DNA227575, 1508
DNA227577, 374
DNA227607, 1961
DNA227656, 6285
DNA227689, 6147
DNA227764, 4891
DNA227795, 792
DNA227821, 36
DNA227873, 4841
DNA227917, 6321
DNA227924, 2099
DNA227929, 2206
DNA227943, 6197
DNA230792, 6342
DNA234442, 4214
DNA237931, 6104
DNA238039, 6181
DNA247474, 578
DNA247595, 2182
DNA251057, 5515
DNA252367, 1081
DNA253804, 1370
DNA254141, 6003
DNA254147, 1627
DNA254165, 6068
DNA254186, 3329
DNA254198, 4719
DNA254204, 994
DNA254240, 6045
DNA254298, 499
DNA254346, 603
DNA254532, 4487
DNA254543, 2740
DNA254548, 5627
DNA254572, 5885
DNA254582, 1155
DNA254620, 1316
DNA254624, 3468
DNA254771, 2693
DNA254777, 3777
DNA254781, 4374
DNA254783, 6318
DNA254785, 6257
DNA254791, 4898
DNA254994, 5890
DNA255046, 5939
DNA255078, 3113
DNA255340, 4208
DNA255370, 4265

DNA255414, 4747
DNA255531, 859
DNA255696, 3109
DNA256070, 6101
DNA256072, 3511
DNA256503, 199
DNA256533, 5513
DNA256555, 5146
DNA256813, 5056
DNA256836, 5387
DNA256840, 5434
DNA256844, 4362
DNA256886, 4370
DNA256905, 545
DNA257253, 1642
DNA257309, 2746
DNA257428, 4854
DNA257511, 1437
DNA257531, 5506
DNA257549, 5965
DNA257916, 402
DNA257965, 3415
DNA269431, 3101
DNA269481, 5593
DNA269498, 4059
DNA269526, 5814
DNA269593, 1854
DNA269630, 5312
DNA269708, 267
DNA269730, 1195
DNA269746, 5873
DNA269793, 6126
DNA269803, 3284
DNA269809, 1687
DNA269816, 1646
DNA269830, 5989
DNA269858, 1270
DNA269894, 5298
DNA269910, 1062
DNA269930, 1097
DNA269952, 3093
DNA270015, 3864
DNA270134, 3208
DNA270154, 746
DNA270254, 3896
DNA270315, 5206
DNA270401, 1099
DNA270458, 3591
DNA270496, 6239
DNA270613, 1892
DNA270615, 1386
DNA270621, 5234
DNA270675, 1850
DNA270677, 3823
DNA270697, 6011
DNA270711, 2371

DNA270721, 3295
DNA270901, 4879
DNA270931, 5504
DNA270954, 6079
DNA270975, 4843
DNA270979, 4805
DNA270991, 2662
DNA271003, 288
DNA271010, 5676
DNA271040, 1997
DNA271060, 751
DNA271171, 4507
DNA271187, 1093
DNA271243, 703
DNA271324, 3380
DNA271344, 3550
DNA271418, 2104
DNA271492, 3727
DNA271580, 6187
DNA271608, 934
DNA271626, 1721
DNA271722, 2751
DNA271841, 5052
DNA271843, 3392
DNA271847, 2660
DNA271931, 1697
DNA271986, 519
DNA272024, 202
DNA272050, 2600
DNA272062, 5625
DNA272090, 2348
DNA272127, 881
DNA272171, 1866
DNA272213, 2734
DNA272263, 1967
DNA272347, 5426
DNA272379, 3555
DNA272413, 3390
DNA272421, 5201
DNA272605, 1335
DNA272655, 2714
DNA272728, 3215
DNA272748, 235
DNA272889, 4812
DNA273014, 4267
DNA273060, 194
DNA273066, 5568
DNA273088, 396
DNA273254, 6230
DNA273320, 5785
DNA273346, 5615
DNA273474, 5421
DNA273487, 6287
DNA273517, 5738
DNA273521, 3066
DNA273600, 5448

DNA273694, 5023
DNA273712, 42
DNA273759, 2899
DNA273800, 689
DNA273839, 4360
DNA273865, 2246
DNA273919, 1182
DNA273992, 6190
DNA274002, 4476
DNA274034, 5277
DNA274058, 3912
DNA274101, 5115
DNA274129, 5892
DNA274139, 5441
DNA274178, 2491
DNA274180, 4516
DNA274206, 1830
DNA274289, 5523
DNA274326, 2176
DNA274361, 3763
DNA274487, 180
DNA274690, 5039
DNA274745, 192
DNA274755, 4975
DNA274759, 340
DNA274761, 5199
DNA274823, 5542
DNA274829, 6149
DNA275049, 662
DNA275066, 744
DNA275139, 292
DNA275144, 4300
DNA275181, 4320
DNA275195, 651
DNA275240, 864
DNA275322, 2723
DNA275334, 2232
DNA275408, 4564
DNA275630, 1904
DNA276159, 6340
DNA281436, 3900
DNA287167, 794
DNA287173, 31
DNA287189, 2265
DNA287216, 2701
DNA287227, 1952
DNA287234, 5014
DNA287237, 3008
DNA287240, 5328
DNA287243, 5279
DNA287246, 1900
DNA287254, 3236
DNA287261, 5668
DNA287270, 5654
DNA287271, 2763
DNA287282, 1582

DNA287290, 5685
DNA287291, 4919
DNA287319, 1969
DNA287331, 4242
DNA287355, 4520
DNA287417, 3218
DNA287425, 4900
DNA287427, 4778
DNA287636, 5154
DNA287642, 2951
DNA288247, 2703
DNA288259, 1598
DNA289522, 4446
DNA289530, 2761
DNA290231, 1638
DNA290234, 540
DNA290259, 6034
DNA290260, 5550
DNA290264, 2007
DNA290284, 350
DNA290292, 4728
DNA290294, 3620
DNA290319, 2680
DNA290585, 1459
DNA290785, 2032
DNA294794, 438
DNA297288, 5638
DNA297388, 4699
DNA297398, 3434
DNA299899, 930
DNA302016, 3827
DNA302020, 1718
DNA304459, 2986
DNA304460, 1908
DNA304488, 2996
DNA304658, 5562
DNA304661, 1946
DNA304662, 5640
DNA304666, 369
DNA304668, 1963
DNA304669, 3887
DNA304670, 5830
DNA304680, 1874
DNA304685, 2435
DNA304686, 220
DNA304694, 3717
DNA304699, 1986
DNA304704, 4575
DNA304707, 2254
DNA304710, 2308
DNA304715, 4714
DNA304716, 1912
DNA304719, 6038
DNA304720, 371
DNA304783, 3631
DNA304801, 2342

DNA304805, 905
DNA304835, 5973
DNA323717, 1
DNA323718, 2
DNA323719, 3
DNA323720, 4
DNA323721, 6
DNA323722, 8
DNA323723, 10
DNA323724, 12
DNA323725, 14
DNA323726, 15
DNA323727, 17
DNA323728, 19
DNA323729, 20
DNA323730, 22
DNA323731, 24
DNA323732, 26
DNA323733, 28
DNA323734, 29
DNA323735, 33
DNA323736, 34
DNA323737, 38
DNA323738, 40
DNA323739, 41
DNA323740, 46
DNA323741, 50
DNA323742, 52
DNA323743, 54
DNA323744, 55
DNA323745, 57
DNA323746, 58
DNA323747, 59
DNA323748, 60
DNA323749, 62
DNA323750, 64
DNA323751, 66
DNA323752, 67
DNA323753, 68
DNA323754, 69
DNA323755, 71
DNA323756, 73
DNA323757, 75
DNA323758, 76
DNA323759, 77
DNA323760, 78
DNA323761, 79
DNA323762, 81
DNA323763, 83
DNA323764, 85
DNA323765, 87
DNA323766, 89
DNA323767, 91
DNA323768, 93
DNA323769, 95
DNA323770, 97

DNA323771, 98
DNA323772, 99
DNA323773, 101
DNA323774, 102
DNA323775, 103
DNA323776, 107
DNA323777, 109
DNA323778, 110
DNA323779, 112
DNA323780, 113
DNA323781, 114
DNA323782, 116
DNA323783, 118
DNA323784, 120
DNA323785, 122
DNA323788, 126
DNA323789, 127
DNA323790, 129
DNA323791, 130
DNA323792, 131
DNA323793, 133
DNA323794, 134
DNA323795, 135
DNA323796, 136
DNA323797, 137
DNA323798, 139
DNA323799, 140
DNA323800, 141
DNA323801, 142
DNA323802, 144
DNA323803, 145
DNA323804, 148
DNA323805, 150
DNA323806, 152
DNA323807, 154
DNA323808, 155
DNA323809, 159
DNA323810, 161
DNA323811, 163
DNA323812, 165
DNA323813, 169
DNA323814, 171
DNA323815, 175
DNA323816, 176
DNA323817, 178
DNA323818, 182
DNA323819, 183
DNA323820, 185
DNA323821, 187
DNA323822, 190
DNA323823, 196
DNA323824, 198
DNA323825, 201
DNA323826, 204
DNA323827, 206
DNA323828, 208

DNA323829, 210
DNA323830, 212
DNA323831, 213
DNA323832, 214
DNA323833, 216
DNA323834, 222
DNA323835, 224
DNA323836, 226
DNA323837, 228
DNA323838, 229
DNA323839, 231
DNA323840, 233
DNA323841, 237
DNA323842, 239
DNA323843, 241
DNA323844, 243
DNA323845, 244
DNA323846, 245
DNA323847, 247
DNA323848, 249
DNA323849, 250
DNA323850, 251
DNA323851, 253
DNA323852, 254
DNA323853, 256
DNA323854, 257
DNA323855, 259
DNA323856, 260
DNA323857, 262
DNA323858, 264
DNA323859, 265
DNA323860, 269
DNA323861, 273
DNA323862, 275
DNA323863, 276
DNA323864, 277
DNA323865, 279
DNA323866, 280
DNA323867, 281
DNA323868, 282
DNA323869, 284
DNA323870, 286
DNA323871, 290
DNA323872, 294
DNA323873, 295
DNA323874, 296
DNA323875, 298
DNA323876, 300
DNA323877, 302
DNA323878, 304
DNA323879, 306
DNA323880, 308
DNA323881, 310
DNA323882, 312
DNA323883, 314
DNA323884, 315

DNA323885, 317
DNA323886, 318
DNA323887, 319
DNA323888, 321
DNA323889, 323
DNA323890, 324
DNA323891, 326
DNA323892, 327
DNA323893, 328
DNA323894, 330
DNA323895, 331
DNA323896, 332
DNA323897, 334
DNA323898, 336
DNA323899, 338
DNA323900, 342
DNA323901, 344
DNA323902, 348
DNA323903, 352
DNA323904, 353
DNA323905, 354
DNA323906, 358
DNA323907, 360
DNA323908, 361
DNA323909, 363
DNA323910, 364
DNA323911, 366
DNA323912, 373
DNA323913, 376
DNA323914, 377
DNA323915, 379
DNA323916, 381
DNA323917, 383
DNA323918, 384
DNA323919, 386
DNA323920, 388
DNA323921, 389
DNA323922, 391
DNA323923, 392
DNA323924, 394
DNA323925, 398
DNA323926, 400
DNA323927, 404
DNA323928, 406
DNA323929, 408
DNA323930, 411
DNA323931, 412
DNA323932, 414
DNA323933, 416
DNA323934, 418
DNA323935, 420
DNA323936, 422
DNA323937, 424
DNA323938, 426
DNA323939, 430
DNA323940, 432

DNA323941, 433	DNA323997, 537
DNA323942, 434	DNA323998, 538
DNA323943, 440	DNA323999, 542
DNA323944, 442	DNA324000, 543
DNA323945, 444	DNA324001, 544
DNA323946, 446	DNA324002, 547
DNA323947, 448	DNA324003, 548
DNA323948, 450	DNA324004, 552
DNA323949, 451	DNA324005, 555
DNA323950, 452	DNA324006, 557
DNA323951, 454	DNA324007, 560
DNA323952, 455	DNA324008, 561
DNA323953, 459	DNA324009, 562
DNA323954, 461	DNA324010, 564
DNA323955, 463	DNA324011, 566
DNA323956, 465	DNA324012, 567
DNA323957, 466	DNA324013, 568
DNA323958, 468	DNA324014, 569
DNA323959, 470	DNA324015, 571
DNA323960, 472	DNA324016, 573
DNA323961, 473	DNA324017, 575
DNA323962, 476	DNA324018, 580
DNA323963, 477	DNA324019, 581
DNA323964, 479	DNA324020, 582
DNA323965, 481	DNA324021, 583
DNA323966, 483	DNA324022, 587
DNA323967, 484	DNA324023, 589
DNA323968, 485	DNA324024, 591
DNA323969, 486	DNA324025, 592
DNA323970, 488	DNA324026, 593
DNA323971, 490	DNA324027, 596
DNA323972, 492	DNA324028, 598
DNA323973, 493	DNA324029, 599
DNA323974, 494	DNA324030, 600
DNA323975, 495	DNA324031, 601
DNA323976, 497	DNA324032, 602
DNA323977, 501	DNA324033, 605
DNA323978, 503	DNA324034, 606
DNA323979, 505	DNA324035, 608
DNA323980, 507	DNA324036, 610
DNA323981, 509	DNA324037, 612
DNA323982, 511	DNA324038, 614
DNA323983, 513	DNA324039, 616
DNA323984, 515	DNA324040, 618
DNA323985, 517	DNA324041, 619
DNA323986, 521	DNA324042, 620
DNA323987, 522	DNA324043, 622
DNA323988, 523	DNA324044, 626
DNA323989, 524	DNA324045, 628
DNA323990, 525	DNA324046, 630
DNA323991, 527	DNA324047, 632
DNA323992, 529	DNA324048, 634
DNA323993, 531	DNA324049, 636
DNA323994, 532	DNA324050, 638
DNA323995, 534	DNA324051, 639
DNA323996, 535	DNA324052, 641

DNA324053, 642
DNA324054, 643
DNA324055, 645
DNA324056, 647
DNA324057, 653
DNA324058, 655
DNA324059, 657
DNA324060, 659
DNA324061, 661
DNA324062, 664
DNA324063, 665
DNA324064, 667
DNA324065, 669
DNA324066, 670
DNA324067, 672
DNA324068, 674
DNA324069, 676
DNA324070, 678
DNA324071, 680
DNA324072, 681
DNA324073, 683
DNA324074, 686
DNA324075, 690
DNA324076, 692
DNA324077, 694
DNA324078, 696
DNA324079, 700
DNA324080, 701
DNA324081, 705
DNA324082, 707
DNA324083, 709
DNA324084, 713
DNA324085, 715
DNA324086, 716
DNA324087, 717
DNA324088, 719
DNA324089, 721
DNA324090, 723
DNA324091, 725
DNA324092, 726
DNA324093, 727
DNA324094, 729
DNA324095, 731
DNA324096, 733
DNA324097, 734
DNA324098, 736
DNA324099, 738
DNA324100, 740
DNA324101, 743
DNA324102, 748
DNA324103, 749
DNA324104, 753
DNA324105, 755
DNA324106, 757
DNA324107, 759
DNA324108, 761

DNA324109, 763
DNA324110, 764
DNA324111, 766
DNA324112, 768
DNA324113, 770
DNA324114, 771
DNA324115, 772
DNA324116, 773
DNA324117, 775
DNA324118, 776
DNA324119, 777
DNA324120, 779
DNA324121, 780
DNA324122, 782
DNA324123, 783
DNA324124, 784
DNA324125, 785
DNA324126, 787
DNA324127, 788
DNA324128, 789
DNA324129, 791
DNA324130, 796
DNA324131, 798
DNA324132, 800
DNA324133, 801
DNA324134, 805
DNA324135, 808
DNA324136, 810
DNA324137, 812
DNA324138, 816
DNA324139, 817
DNA324140, 818
DNA324141, 820
DNA324142, 822
DNA324143, 823
DNA324144, 824
DNA324145, 825
DNA324146, 827
DNA324147, 829
DNA324148, 831
DNA324149, 832
DNA324150, 834
DNA324151, 836
DNA324152, 838
DNA324153, 839
DNA324154, 841
DNA324155, 842
DNA324156, 843
DNA324157, 845
DNA324158, 847
DNA324159, 849
DNA324160, 850
DNA324161, 851
DNA324162, 853
DNA324163, 856
DNA324164, 857

DNA324165, 858
DNA324166, 861
DNA324167, 862
DNA324168, 866
DNA324169, 867
DNA324170, 869
DNA324171, 871
DNA324172, 873
DNA324173, 875
DNA324174, 877
DNA324175, 878
DNA324176, 880
DNA324177, 883
DNA324178, 885
DNA324179, 887
DNA324180, 889
DNA324181, 891
DNA324182, 893
DNA324183, 894
DNA324184, 896
DNA324185, 900
DNA324186, 901
DNA324187, 903
DNA324188, 907
DNA324189, 909
DNA324190, 910
DNA324191, 911
DNA324192, 912
DNA324193, 914
DNA324194, 916
DNA324195, 918
DNA324196, 920
DNA324197, 921
DNA324198, 923
DNA324199, 925
DNA324200, 926
DNA324201, 927
DNA324202, 928
DNA324203, 929
DNA324204, 932
DNA324205, 933
DNA324206, 936
DNA324207, 938
DNA324208, 940
DNA324209, 941
DNA324210, 942
DNA324211, 944
DNA324212, 946
DNA324213, 948
DNA324214, 950
DNA324215, 952
DNA324216, 954
DNA324217, 955
DNA324218, 957
DNA324219, 958
DNA324220, 960

DNA324221, 962
DNA324222, 964
DNA324223, 965
DNA324224, 966
DNA324225, 968
DNA324226, 970
DNA324227, 971
DNA324228, 973
DNA324229, 975
DNA324230, 979
DNA324231, 980
DNA324232, 982
DNA324233, 984
DNA324234, 985
DNA324235, 986
DNA324236, 988
DNA324237, 990
DNA324238, 992
DNA324239, 993
DNA324240, 996
DNA324241, 1000
DNA324242, 1002
DNA324243, 1004
DNA324244, 1006
DNA324245, 1007
DNA324246, 1009
DNA324247, 1011
DNA324248, 1012
DNA324249, 1014
DNA324250, 1016
DNA324251, 1018
DNA324252, 1020
DNA324253, 1022
DNA324254, 1026
DNA324255, 1028
DNA324256, 1029
DNA324257, 1030
DNA324258, 1032
DNA324259, 1034
DNA324260, 1036
DNA324261, 1037
DNA324262, 1039
DNA324263, 1040
DNA324264, 1041
DNA324265, 1042
DNA324266, 1043
DNA324267, 1045
DNA324268, 1047
DNA324269, 1049
DNA324270, 1051
DNA324271, 1053
DNA324272, 1055
DNA324273, 1057
DNA324274, 1059
DNA324275, 1060
DNA324276, 1064

DNA324277, 1068
DNA324278, 1070
DNA324279, 1072
DNA324280, 1074
DNA324281, 1075
DNA324282, 1076
DNA324283, 1078
DNA324284, 1079
DNA324285, 1083
DNA324286, 1085
DNA324287, 1086
DNA324288, 1088
DNA324289, 1091
DNA324290, 1095
DNA324291, 1101
DNA324292, 1103
DNA324293, 1105
DNA324294, 1106
DNA324295, 1110
DNA324296, 1112
DNA324297, 1113
DNA324298, 1115
DNA324299, 1117
DNA324300, 1119
DNA324301, 1120
DNA324302, 1121
DNA324303, 1122
DNA324304, 1123
DNA324305, 1125
DNA324306, 1127
DNA324307, 1130
DNA324308, 1131
DNA324309, 1132
DNA324310, 1134
DNA324311, 1136
DNA324312, 1137
DNA324313, 1139
DNA324314, 1140
DNA324315, 1141
DNA324316, 1143
DNA324317, 1147
DNA324318, 1151
DNA324319, 1157
DNA324320, 1159
DNA324321, 1161
DNA324322, 1162
DNA324323, 1163
DNA324324, 1167
DNA324325, 1169
DNA324326, 1170
DNA324327, 1172
DNA324328, 1174
DNA324329, 1176
DNA324330, 1178
DNA324331, 1180
DNA324332, 1184

DNA324333, 1186
DNA324334, 1187
DNA324335, 1190
DNA324336, 1192
DNA324337, 1193
DNA324338, 1197
DNA324339, 1198
DNA324340, 1199
DNA324341, 1201
DNA324342, 1202
DNA324343, 1203
DNA324344, 1204
DNA324345, 1205
DNA324346, 1206
DNA324347, 1208
DNA324348, 1209
DNA324349, 1211
DNA324350, 1213
DNA324351, 1214
DNA324352, 1216
DNA324353, 1218
DNA324354, 1220
DNA324355, 1221
DNA324356, 1225
DNA324357, 1227
DNA324358, 1229
DNA324359, 1231
DNA324360, 1232
DNA324361, 1234
DNA324362, 1235
DNA324363, 1237
DNA324364, 1238
DNA324365, 1240
DNA324366, 1242
DNA324367, 1243
DNA324368, 1244
DNA324369, 1245
DNA324370, 1246
DNA324371, 1248
DNA324372, 1250
DNA324373, 1252
DNA324374, 1254
DNA324375, 1255
DNA324376, 1256
DNA324377, 1258
DNA324378, 1260
DNA324379, 1262
DNA324380, 1263
DNA324381, 1264
DNA324382, 1265
DNA324383, 1266
DNA324384, 1267
DNA324385, 1268
DNA324386, 1272
DNA324387, 1274
DNA324388, 1275

DNA324389, 1276   DNA324445, 1376
DNA324390, 1278   DNA324446, 1378
DNA324391, 1280   DNA324447, 1380
DNA324392, 1282   DNA324448, 1382
DNA324393, 1284   DNA324449, 1384
DNA324394, 1286   DNA324450, 1388
DNA324395, 1288   DNA324451, 1390
DNA324396, 1289   DNA324452, 1392
DNA324397, 1290   DNA324453, 1394
DNA324398, 1291   DNA324454, 1396
DNA324399, 1292   DNA324455, 1398
DNA324400, 1294   DNA324456, 1400
DNA324401, 1295   DNA324457, 1402
DNA324402, 1296   DNA324458, 1404
DNA324403, 1297   DNA324459, 1406
DNA324404, 1299   DNA324460, 1408
DNA324405, 1300   DNA324461, 1410
DNA324406, 1302   DNA324462, 1412
DNA324407, 1304   DNA324463, 1413
DNA324408, 1306   DNA324464, 1414
DNA324409, 1308   DNA324465, 1416
DNA324410, 1310   DNA324466, 1417
DNA324411, 1312   DNA324467, 1418
DNA324412, 1313   DNA324468, 1419
DNA324413, 1314   DNA324469, 1421
DNA324414, 1315   DNA324470, 1423
DNA324415, 1318   DNA324471, 1424
DNA324416, 1320   DNA324472, 1425
DNA324417, 1322   DNA324473, 1427
DNA324418, 1323   DNA324474, 1429
DNA324419, 1325   DNA324475, 1430
DNA324420, 1329   DNA324476, 1432
DNA324421, 1332   DNA324478, 1433
DNA324422, 1333   DNA324479, 1434
DNA324423, 1337   DNA324480, 1435
DNA324424, 1338   DNA324481, 1439
DNA324425, 1340   DNA324482, 1440
DNA324426, 1341   DNA324483, 1441
DNA324427, 1343   DNA324484, 1442
DNA324428, 1344   DNA324485, 1443
DNA324429, 1345   DNA324486, 1445
DNA324430, 1347   DNA324487, 1448
DNA324431, 1348   DNA324488, 1449
DNA324432, 1350   DNA324489, 1451
DNA324433, 1354   DNA324490, 1452
DNA324434, 1356   DNA324491, 1453
DNA324435, 1358   DNA324492, 1455
DNA324436, 1359   DNA324493, 1456
DNA324437, 1360   DNA324494, 1457
DNA324438, 1361   DNA324495, 1461
DNA324439, 1363   DNA324496, 1463
DNA324440, 1364   DNA324497, 1464
DNA324441, 1365   DNA324498, 1465
DNA324442, 1366   DNA324499, 1466
DNA324443, 1372   DNA324500, 1468
DNA324444, 1374   DNA324501, 1469

DNA324502, 1470
DNA324503, 1471
DNA324504, 1472
DNA324505, 1473
DNA324506, 1474
DNA324507, 1476
DNA324508, 1477
DNA324509, 1478
DNA324510, 1480
DNA324511, 1482
DNA324512, 1483
DNA324513, 1484
DNA324514, 1485
DNA324515, 1487
DNA324516, 1491
DNA324517, 1493
DNA324518, 1494
DNA324519, 1496
DNA324520, 1497
DNA324521, 1499
DNA324522, 1500
DNA324523, 1502
DNA324524, 1504
DNA324525, 1506
DNA324526, 1510
DNA324527, 1513
DNA324528, 1517
DNA324529, 1519
DNA324530, 1520
DNA324531, 1522
DNA324532, 1524
DNA324533, 1525
DNA324534, 1526
DNA324535, 1528
DNA324536, 1530
DNA324537, 1531
DNA324538, 1532
DNA324539, 1533
DNA324540, 1534
DNA324541, 1535
DNA324542, 1537
DNA324543, 1539
DNA324544, 1540
DNA324545, 1541
DNA324546, 1543
DNA324547, 1544
DNA324548, 1545
DNA324549, 1547
DNA324550, 1548
DNA324551, 1549
DNA324552, 1550
DNA324554, 1551
DNA324555, 1552
DNA324556, 1553
DNA324557, 1554
DNA324558, 1555

DNA324559, 1556
DNA324560, 1557
DNA324561, 1559
DNA324562, 1561
DNA324563, 1562
DNA324564, 1564
DNA324565, 1565
DNA324566, 1567
DNA324567, 1568
DNA324568, 1570
DNA324569, 1572
DNA324570, 1575
DNA324571, 1577
DNA324572, 1579
DNA324573, 1581
DNA324574, 1584
DNA324575, 1586
DNA324576, 1587
DNA324577, 1588
DNA324578, 1590
DNA324579, 1591
DNA324580, 1592
DNA324581, 1593
DNA324582, 1595
DNA324583, 1596
DNA324584, 1597
DNA324585, 1600
DNA324586, 1602
DNA324587, 1604
DNA324588, 1606
DNA324589, 1608
DNA324590, 1609
DNA324591, 1610
DNA324592, 1611
DNA324593, 1612
DNA324594, 1614
DNA324595, 1615
DNA324596, 1617
DNA324597, 1619
DNA324598, 1621
DNA324599, 1622
DNA324600, 1623
DNA324601, 1624
DNA324602, 1626
DNA324603, 1629
DNA324604, 1631
DNA324605, 1632
DNA324606, 1634
DNA324607, 1636
DNA324608, 1640
DNA324609, 1641
DNA324610, 1644
DNA324611, 1648
DNA324612, 1650
DNA324613, 1652
DNA324614, 1654

DNA324615, 1655
DNA324616, 1656
DNA324617, 1658
DNA324618, 1660
DNA324619, 1662
DNA324620, 1663
DNA324621, 1664
DNA324622, 1666
DNA324623, 1668
DNA324624, 1669
DNA324625, 1670
DNA324626, 1673
DNA324627, 1675
DNA324628, 1679
DNA324629, 1681
DNA324630, 1683
DNA324631, 1685
DNA324632, 1691
DNA324633, 1693
DNA324634, 1695
DNA324635, 1699
DNA324636, 1700
DNA324637, 1701
DNA324638, 1702
DNA324639, 1704
DNA324640, 1706
DNA324641, 1708
DNA324642, 1710
DNA324643, 1711
DNA324644, 1712
DNA324645, 1713
DNA324646, 1714
DNA324647, 1716
DNA324648, 1720
DNA324649, 1723
DNA324650, 1724
DNA324651, 1726
DNA324652, 1728
DNA324653, 1730
DNA324654, 1734
DNA324655, 1736
DNA324656, 1738
DNA324657, 1740
DNA324658, 1742
DNA324659, 1744
DNA324660, 1746
DNA324661, 1748
DNA324662, 1750
DNA324663, 1752
DNA324664, 1754
DNA324665, 1756
DNA324666, 1758
DNA324667, 1760
DNA324668, 1762
DNA324669, 1764
DNA324670, 1766

DNA324671, 1768
DNA324672, 1770
DNA324673, 1772
DNA324674, 1774
DNA324675, 1776
DNA324676, 1778
DNA324677, 1779
DNA324678, 1781
DNA324679, 1783
DNA324680, 1785
DNA324681, 1787
DNA324682, 1789
DNA324683, 1793
DNA324684, 1795
DNA324685, 1797
DNA324686, 1798
DNA324687, 1799
DNA324688, 1800
DNA324689, 1802
DNA324690, 1803
DNA324691, 1805
DNA324692, 1807
DNA324693, 1808
DNA324694, 1810
DNA324695, 1811
DNA324696, 1814
DNA324697, 1816
DNA324698, 1817
DNA324699, 1818
DNA324700, 1819
DNA324701, 1820
DNA324702, 1821
DNA324703, 1823
DNA324704, 1824
DNA324705, 1826
DNA324706, 1832
DNA324707, 1834
DNA324708, 1836
DNA324709, 1838
DNA324710, 1840
DNA324711, 1841
DNA324712, 1842
DNA324713, 1843
DNA324714, 1845
DNA324715, 1846
DNA324716, 1848
DNA324717, 1852
DNA324718, 1856
DNA324719, 1857
DNA324720, 1858
DNA324721, 1859
DNA324722, 1860
DNA324723, 1861
DNA324724, 1862
DNA324725, 1863
DNA324726, 1865

DNA324727, 1868
DNA324728, 1870
DNA324729, 1872
DNA324730, 1876
DNA324731, 1877
DNA324732, 1878
DNA324733, 1879
DNA324734, 1880
DNA324735, 1882
DNA324736, 1883
DNA324737, 1884
DNA324738, 1888
DNA324739, 1890
DNA324740, 1894
DNA324741, 1896
DNA324742, 1898
DNA324743, 1902
DNA324744, 1906
DNA324745, 1910
DNA324746, 1914
DNA324747, 1916
DNA324748, 1918
DNA324749, 1920
DNA324750, 1921
DNA324751, 1922
DNA324752, 1924
DNA324753, 1926
DNA324754, 1928
DNA324755, 1929
DNA324756, 1931
DNA324757, 1932
DNA324758, 1934
DNA324759, 1936
DNA324760, 1937
DNA324761, 1938
DNA324763, 1939
DNA324764, 1940
DNA324765, 1941
DNA324766, 1944
DNA324767, 1948
DNA324768, 1949
DNA324769, 1951
DNA324770, 1954
DNA324771, 1955
DNA324772, 1956
DNA324773, 1957
DNA324774, 1959
DNA324775, 1965
DNA324776, 1971
DNA324777, 1973
DNA324778, 1975
DNA324779, 1977
DNA324780, 1979
DNA324781, 1981
DNA324782, 1983
DNA324783, 1984

DNA324784, 1988
DNA324785, 1990
DNA324786, 1992
DNA324787, 1994
DNA324788, 1995
DNA324789, 1999
DNA324790, 2000
DNA324791, 2002
DNA324792, 2004
DNA324793, 2006
DNA324794, 2009
DNA324795, 2011
DNA324796, 2013
DNA324797, 2015
DNA324798, 2016
DNA324799, 2017
DNA324800, 2019
DNA324801, 2021
DNA324802, 2023
DNA324803, 2025
DNA324804, 2027
DNA324805, 2029
DNA324806, 2031
DNA324807, 2036
DNA324808, 2037
DNA324809, 2039
DNA324810, 2041
DNA324811, 2042
DNA324812, 2044
DNA324813, 2045
DNA324814, 2047
DNA324815, 2049
DNA324816, 2050
DNA324817, 2052
DNA324818, 2054
DNA324819, 2056
DNA324820, 2057
DNA324821, 2058
DNA324822, 2059
DNA324823, 2060
DNA324824, 2062
DNA324825, 2064
DNA324826, 2065
DNA324827, 2066
DNA324828, 2068
DNA324829, 2069
DNA324830, 2072
DNA324831, 2074
DNA324832, 2075
DNA324833, 2077
DNA324834, 2079
DNA324835, 2080
DNA324836, 2081
DNA324837, 2083
DNA324838, 2085
DNA324839, 2087

DNA324840, 2089
DNA324841, 2090
DNA324842, 2091
DNA324843, 2092
DNA324844, 2094
DNA324845, 2096
DNA324846, 2098
DNA324847, 2101
DNA324848, 2103
DNA324849, 2106
DNA324850, 2107
DNA324851, 2108
DNA324852, 2110
DNA324853, 2111
DNA324854, 2113
DNA324855, 2114
DNA324856, 2116
DNA324857, 2118
DNA324858, 2119
DNA324859, 2121
DNA324860, 2122
DNA324861, 2123
DNA324862, 2124
DNA324863, 2126
DNA324864, 2128
DNA324865, 2130
DNA324866, 2131
DNA324867, 2132
DNA324868, 2134
DNA324870, 2135
DNA324871, 2137
DNA324872, 2139
DNA324873, 2140
DNA324874, 2141
DNA324875, 2142
DNA324876, 2144
DNA324877, 2145
DNA324878, 2146
DNA324879, 2147
DNA324880, 2148
DNA324881, 2150
DNA324882, 2152
DNA324883, 2154
DNA324884, 2155
DNA324885, 2157
DNA324886, 2159
DNA324887, 2160
DNA324888, 2161
DNA324889, 2163
DNA324890, 2165
DNA324891, 2167
DNA324892, 2168
DNA324893, 2170
DNA324894, 2172
DNA324895, 2178
DNA324896, 2180

DNA324897, 2184
DNA324898, 2186
DNA324899, 2188
DNA324900, 2190
DNA324901, 2191
DNA324902, 2195
DNA324903, 2197
DNA324904, 2198
DNA324905, 2200
DNA324906, 2202
DNA324907, 2203
DNA324908, 2204
DNA324909, 2205
DNA324910, 2208
DNA324911, 2210
DNA324912, 2212
DNA324913, 2214
DNA324914, 2216
DNA324915, 2218
DNA324916, 2219
DNA324917, 2220
DNA324918, 2222
DNA324919, 2224
DNA324920, 2225
DNA324921, 2226
DNA324922, 2228
DNA324923, 2230
DNA324924, 2234
DNA324925, 2236
DNA324926, 2238
DNA324927, 2240
DNA324928, 2244
DNA324929, 2245
DNA324930, 2248
DNA324931, 2249
DNA324932, 2251
DNA324933, 2253
DNA324934, 2256
DNA324935, 2258
DNA324936, 2259
DNA324937, 2260
DNA324938, 2264
DNA324939, 2267
DNA324940, 2269
DNA324941, 2271
DNA324942, 2273
DNA324943, 2276
DNA324944, 2278
DNA324945, 2280
DNA324946, 2281
DNA324947, 2282
DNA324948, 2284
DNA324949, 2286
DNA324950, 2288
DNA324951, 2290
DNA324952, 2292

DNA324953, 2293
DNA324954, 2295
DNA324955, 2297
DNA324956, 2299
DNA324957, 2300
DNA324958, 2301
DNA324959, 2302
DNA324960, 2304
DNA324961, 2306
DNA324962, 2310
DNA324963, 2311
DNA324964, 2312
DNA324965, 2313
DNA324966, 2315
DNA324967, 2316
DNA324968, 2317
DNA324969, 2318
DNA324971, 2319
DNA324972, 2321
DNA324973, 2322
DNA324974, 2323
DNA324975, 2325
DNA324976, 2326
DNA324977, 2328
DNA324978, 2329
DNA324979, 2331
DNA324980, 2333
DNA324981, 2335
DNA324982, 2337
DNA324983, 2338
DNA324984, 2340
DNA324985, 2344
DNA324986, 2346
DNA324987, 2350
DNA324988, 2351
DNA324989, 2352
DNA324990, 2353
DNA324991, 2355
DNA324992, 2357
DNA324993, 2360
DNA324994, 2363
DNA324995, 2365
DNA324996, 2367
DNA324997, 2369
DNA324998, 2373
DNA324999, 2375
DNA325000, 2376
DNA325001, 2378
DNA325002, 2380
DNA325003, 2381
DNA325004, 2383
DNA325005, 2385
DNA325006, 2386
DNA325007, 2387
DNA325008, 2389
DNA325009, 2391

DNA325010, 2395
DNA325011, 2396
DNA325012, 2398
DNA325013, 2400
DNA325014, 2402
DNA325015, 2403
DNA325016, 2404
DNA325017, 2406
DNA325018, 2407
DNA325019, 2409
DNA325020, 2411
DNA325021, 2413
DNA325022, 2414
DNA325023, 2416
DNA325024, 2417
DNA325025, 2418
DNA325026, 2420
DNA325027, 2422
DNA325028, 2423
DNA325029, 2425
DNA325030, 2427
DNA325031, 2429
DNA325032, 2430
DNA325033, 2432
DNA325034, 2433
DNA325035, 2434
DNA325036, 2437
DNA325037, 2439
DNA325038, 2440
DNA325039, 2442
DNA325040, 2444
DNA325041, 2446
DNA325042, 2447
DNA325043, 2449
DNA325044, 2451
DNA325045, 2453
DNA325046, 2454
DNA325047, 2455
DNA325048, 2456
DNA325049, 2460
DNA325050, 2462
DNA325051, 2464
DNA325052, 2466
DNA325053, 2467
DNA325054, 2469
DNA325055, 2470
DNA325056, 2471
DNA325057, 2472
DNA325058, 2473
DNA325059, 2475
DNA325060, 2476
DNA325061, 2478
DNA325062, 2480
DNA325063, 2482
DNA325064, 2483
DNA325065, 2485

DNA325066, 2487
DNA325067, 2488
DNA325068, 2490
DNA325069, 2493
DNA325070, 2497
DNA325071, 2499
DNA325072, 2501
DNA325073, 2503
DNA325074, 2505
DNA325075, 2508
DNA325076, 2510
DNA325077, 2514
DNA325078, 2515
DNA325079, 2517
DNA325080, 2519
DNA325081, 2521
DNA325082, 2523
DNA325083, 2525
DNA325084, 2526
DNA325085, 2527
DNA325086, 2529
DNA325087, 2530
DNA325088, 2531
DNA325089, 2533
DNA325090, 2534
DNA325091, 2536
DNA325092, 2538
DNA325093, 2540
DNA325094, 2541
DNA325095, 2543
DNA325096, 2544
DNA325097, 2548
DNA325098, 2550
DNA325099, 2552
DNA325100, 2554
DNA325101, 2556
DNA325102, 2557
DNA325103, 2558
DNA325104, 2559
DNA325105, 2560
DNA325106, 2561
DNA325107, 2562
DNA325108, 2563
DNA325109, 2564
DNA325110, 2567
DNA325111, 2569
DNA325112, 2571
DNA325113, 2572
DNA325114, 2574
DNA325115, 2575
DNA325116, 2577
DNA325117, 2579
DNA325118, 2581
DNA325119, 2582
DNA325120, 2583
DNA325121, 2584

DNA325122, 2586
DNA325123, 2588
DNA325124, 2590
DNA325125, 2592
DNA325126, 2595
DNA325127, 2596
DNA325128, 2598
DNA325129, 2602
DNA325130, 2604
DNA325131, 2605
DNA325132, 2606
DNA325133, 2608
DNA325134, 2609
DNA325135, 2611
DNA325136, 2612
DNA325137, 2613
DNA325138, 2614
DNA325139, 2616
DNA325140, 2618
DNA325141, 2619
DNA325143, 2620
DNA325144, 2622
DNA325145, 2623
DNA325146, 2625
DNA325147, 2626
DNA325148, 2627
DNA325149, 2628
DNA325150, 2629
DNA325151, 2631
DNA325152, 2633
DNA325153, 2635
DNA325154, 2637
DNA325155, 2638
DNA325156, 2640
DNA325157, 2641
DNA325158, 2642
DNA325159, 2644
DNA325160, 2645
DNA325161, 2646
DNA325162, 2647
DNA325163, 2649
DNA325164, 2651
DNA325165, 2653
DNA325166, 2655
DNA325167, 2657
DNA325168, 2659
DNA325169, 2664
DNA325170, 2666
DNA325171, 2668
DNA325172, 2672
DNA325173, 2673
DNA325174, 2675
DNA325175, 2677
DNA325176, 2679
DNA325177, 2682
DNA325178, 2684

DNA325179, 2686
DNA325180, 2688
DNA325181, 2689
DNA325182, 2697
DNA325183, 2699
DNA325184, 2700
DNA325185, 2705
DNA325186, 2707
DNA325187, 2708
DNA325188, 2710
DNA325189, 2711
DNA325190, 2712
DNA325191, 2716
DNA325192, 2718
DNA325193, 2720
DNA325194, 2722
DNA325195, 2725
DNA325196, 2726
DNA325197, 2727
DNA325198, 2728
DNA325199, 2730
DNA325200, 2732
DNA325201, 2736
DNA325202, 2738
DNA325203, 2742
DNA325204, 2744
DNA325205, 2748
DNA325206, 2750
DNA325207, 2753
DNA325208, 2755
DNA325209, 2756
DNA325210, 2757
DNA325211, 2759
DNA325212, 2760
DNA325213, 2765
DNA325214, 2766
DNA325215, 2769
DNA325216, 2771
DNA325217, 2772
DNA325218, 2774
DNA325219, 2775
DNA325220, 2777
DNA325221, 2778
DNA325222, 2780
DNA325223, 2784
DNA325224, 2786
DNA325225, 2787
DNA325226, 2789
DNA325227, 2790
DNA325228, 2792
DNA325229, 2794
DNA325230, 2798
DNA325231, 2799
DNA325232, 2800
DNA325233, 2801
DNA325234, 2802

DNA325235, 2803
DNA325236, 2804
DNA325237, 2806
DNA325238, 2808
DNA325239, 2809
DNA325240, 2811
DNA325241, 2813
DNA325242, 2815
DNA325243, 2817
DNA325244, 2818
DNA325245, 2819
DNA325246, 2820
DNA325247, 2822
DNA325248, 2824
DNA325249, 2825
DNA325250, 2826
DNA325251, 2828
DNA325252, 2830
DNA325253, 2832
DNA325254, 2833
DNA325255, 2834
DNA325256, 2836
DNA325257, 2838
DNA325258, 2839
DNA325259, 2841
DNA325260, 2843
DNA325261, 2845
DNA325262, 2846
DNA325263, 2847
DNA325264, 2849
DNA325265, 2851
DNA325266, 2852
DNA325267, 2854
DNA325268, 2855
DNA325269, 2857
DNA325270, 2859
DNA325271, 2860
DNA325272, 2862
DNA325273, 2864
DNA325274, 2866
DNA325275, 2868
DNA325276, 2870
DNA325277, 2871
DNA325278, 2873
DNA325279, 2874
DNA325280, 2875
DNA325281, 2876
DNA325282, 2878
DNA325283, 2879
DNA325284, 2881
DNA325285, 2883
DNA325286, 2885
DNA325287, 2887
DNA325288, 2889
DNA325289, 2891
DNA325290, 2893

DNA325291, 2895
DNA325292, 2897
DNA325293, 2898
DNA325294, 2901
DNA325295, 2902
DNA325296, 2904
DNA325297, 2906
DNA325298, 2908
DNA325299, 2909
DNA325300, 2910
DNA325301, 2911
DNA325302, 2913
DNA325303, 2914
DNA325304, 2916
DNA325305, 2918
DNA325306, 2919
DNA325307, 2921
DNA325308, 2922
DNA325309, 2923
DNA325310, 2925
DNA325311, 2926
DNA325312, 2927
DNA325313, 2929
DNA325314, 2930
DNA325315, 2931
DNA325316, 2933
DNA325317, 2934
DNA325318, 2935
DNA325319, 2937
DNA325320, 2939
DNA325321, 2941
DNA325322, 2942
DNA325323, 2944
DNA325324, 2945
DNA325325, 2949
DNA325326, 2953
DNA325327, 2955
DNA325328, 2957
DNA325329, 2959
DNA325330, 2963
DNA325331, 2966
DNA325332, 2968
DNA325333, 2970
DNA325334, 2971
DNA325335, 2973
DNA325336, 2975
DNA325337, 2976
DNA325338, 2977
DNA325339, 2978
DNA325340, 2980
DNA325341, 2984
DNA325342, 2988
DNA325343, 2992
DNA325344, 2994
DNA325345, 2998
DNA325346, 2999

DNA325347, 3000
DNA325348, 3002
DNA325349, 3006
DNA325350, 3010
DNA325351, 3012
DNA325352, 3013
DNA325353, 3015
DNA325354, 3016
DNA325355, 3017
DNA325356, 3019
DNA325357, 3020
DNA325358, 3022
DNA325359, 3024
DNA325360, 3026
DNA325361, 3028
DNA325362, 3029
DNA325363, 3031
DNA325364, 3033
DNA325365, 3035
DNA325366, 3037
DNA325367, 3039
DNA325368, 3041
DNA325369, 3042
DNA325370, 3044
DNA325371, 3045
DNA325372, 3047
DNA325373, 3049
DNA325374, 3053
DNA325375, 3055
DNA325376, 3057
DNA325377, 3058
DNA325378, 3059
DNA325379, 3061
DNA325380, 3063
DNA325381, 3065
DNA325382, 3068
DNA325383, 3070
DNA325384, 3072
DNA325385, 3073
DNA325386, 3074
DNA325387, 3075
DNA325388, 3078
DNA325389, 3080
DNA325390, 3082
DNA325391, 3084
DNA325392, 3086
DNA325393, 3088
DNA325394, 3089
DNA325395, 3091
DNA325396, 3095
DNA325397, 3097
DNA325398, 3099
DNA325399, 3103
DNA325400, 3104
DNA325401, 3106
DNA325402, 3107

DNA325403, 3111
DNA325404, 3115
DNA325405, 3117
DNA325406, 3119
DNA325407, 3120
DNA325408, 3122
DNA325409, 3124
DNA325410, 3125
DNA325411, 3127
DNA325412, 3129
DNA325413, 3131
DNA325414, 3133
DNA325415, 3135
DNA325416, 3136
DNA325417, 3137
DNA325418, 3139
DNA325419, 3141
DNA325420, 3142
DNA325421, 3144
DNA325422, 3146
DNA325423, 3148
DNA325424, 3149
DNA325425, 3151
DNA325426, 3152
DNA325427, 3153
DNA325428, 3155
DNA325429, 3157
DNA325430, 3159
DNA325431, 3161
DNA325432, 3163
DNA325433, 3165
DNA325434, 3167
DNA325435, 3169
DNA325436, 3170
DNA325437, 3171
DNA325438, 3173
DNA325439, 3177
DNA325440, 3178
DNA325441, 3180
DNA325442, 3182
DNA325443, 3183
DNA325444, 3184
DNA325445, 3185
DNA325446, 3187
DNA325447, 3188
DNA325448, 3190
DNA325449, 3192
DNA325450, 3193
DNA325451, 3194
DNA325452, 3195
DNA325453, 3196
DNA325454, 3197
DNA325455, 3199
DNA325456, 3201
DNA325457, 3202
DNA325458, 3210

DNA325459, 3212
DNA325460, 3214
DNA325461, 3217
DNA325462, 3222
DNA325463, 3223
DNA325464, 3224
DNA325465, 3225
DNA325466, 3227
DNA325467, 3228
DNA325468, 3230
DNA325469, 3232
DNA325470, 3234
DNA325471, 3238
DNA325472, 3240
DNA325473, 3242
DNA325474, 3244
DNA325475, 3247
DNA325476, 3248
DNA325477, 3249
DNA325478, 3251
DNA325479, 3253
DNA325480, 3255
DNA325481, 3256
DNA325482, 3258
DNA325483, 3260
DNA325484, 3261
DNA325485, 3263
DNA325486, 3264
DNA325487, 3266
DNA325488, 3268
DNA325489, 3269
DNA325490, 3270
DNA325491, 3271
DNA325492, 3273
DNA325493, 3275
DNA325494, 3276
DNA325495, 3278
DNA325496, 3279
DNA325497, 3281
DNA325498, 3283
DNA325499, 3286
DNA325500, 3287
DNA325501, 3288
DNA325502, 3289
DNA325503, 3291
DNA325504, 3293
DNA325505, 3294
DNA325506, 3299
DNA325507, 3301
DNA325508, 3303
DNA325509, 3304
DNA325510, 3306
DNA325511, 3308
DNA325512, 3310
DNA325513, 3311
DNA325514, 3315

DNA325515, 3316
DNA325516, 3318
DNA325517, 3320
DNA325518, 3322
DNA325519, 3324
DNA325520, 3325
DNA325521, 3326
DNA325522, 3328
DNA325523, 3331
DNA325524, 3335
DNA325525, 3336
DNA325526, 3337
DNA325527, 3339
DNA325528, 3341
DNA325529, 3342
DNA325530, 3344
DNA325531, 3346
DNA325532, 3348
DNA325533, 3349
DNA325534, 3350
DNA325535, 3352
DNA325536, 3353
DNA325537, 3355
DNA325538, 3357
DNA325539, 3358
DNA325540, 3359
DNA325541, 3361
DNA325542, 3363
DNA325543, 3364
DNA325544, 3365
DNA325545, 3366
DNA325546, 3367
DNA325547, 3369
DNA325548, 3371
DNA325549, 3373
DNA325550, 3374
DNA325551, 3378
DNA325552, 3382
DNA325553, 3384
DNA325554, 3386
DNA325555, 3388
DNA325556, 3394
DNA325557, 3395
DNA325558, 3397
DNA325559, 3398
DNA325560, 3399
DNA325561, 3400
DNA325562, 3401
DNA325563, 3403
DNA325564, 3404
DNA325565, 3406
DNA325566, 3407
DNA325567, 3409
DNA325568, 3411
DNA325569, 3413
DNA325570, 3414

DNA325571, 3417
DNA325572, 3418
DNA325573, 3420
DNA325574, 3422
DNA325575, 3424
DNA325576, 3426
DNA325577, 3427
DNA325578, 3428
DNA325579, 3429
DNA325580, 3430
DNA325581, 3432
DNA325582, 3436
DNA325583, 3437
DNA325584, 3439
DNA325585, 3441
DNA325586, 3442
DNA325587, 3444
DNA325588, 3446
DNA325589, 3448
DNA325590, 3450
DNA325591, 3451
DNA325592, 3454
DNA325593, 3455
DNA325594, 3457
DNA325595, 3458
DNA325596, 3460
DNA325597, 3462
DNA325598, 3463
DNA325599, 3465
DNA325600, 3470
DNA325601, 3472
DNA325602, 3475
DNA325603, 3482
DNA325604, 3483
DNA325605, 3485
DNA325606, 3486
DNA325607, 3488
DNA325608, 3491
DNA325609, 3493
DNA325610, 3494
DNA325611, 3495
DNA325612, 3496
DNA325613, 3500
DNA325614, 3501
DNA325615, 3503
DNA325616, 3504
DNA325617, 3506
DNA325618, 3507
DNA325619, 3509
DNA325620, 3513
DNA325621, 3515
DNA325622, 3517
DNA325623, 3519
DNA325624, 3522
DNA325625, 3528
DNA325626, 3529

DNA325627, 3531
DNA325628, 3532
DNA325629, 3533
DNA325630, 3535
DNA325631, 3536
DNA325632, 3538
DNA325633, 3539
DNA325634, 3540
DNA325635, 3542
DNA325636, 3543
DNA325637, 3545
DNA325638, 3546
DNA325639, 3548
DNA325640, 3552
DNA325641, 3554
DNA325642, 3557
DNA325643, 3559
DNA325644, 3560
DNA325645, 3561
DNA325646, 3562
DNA325647, 3564
DNA325648, 3566
DNA325649, 3568
DNA325650, 3570
DNA325651, 3571
DNA325652, 3572
DNA325653, 3574
DNA325654, 3576
DNA325655, 3578
DNA325656, 3579
DNA325657, 3580
DNA325658, 3581
DNA325659, 3582
DNA325660, 3583
DNA325661, 3584
DNA325662, 3585
DNA325663, 3586
DNA325664, 3590
DNA325665, 3595
DNA325666, 3596
DNA325667, 3598
DNA325668, 3599
DNA325669, 3602
DNA325670, 3604
DNA325671, 3606
DNA325672, 3608
DNA325673, 3610
DNA325674, 3612
DNA325675, 3614
DNA325676, 3616
DNA325677, 3618
DNA325678, 3622
DNA325679, 3624
DNA325680, 3626
DNA325681, 3630
DNA325682, 3633

DNA325683, 3634
DNA325684, 3635
DNA325685, 3636
DNA325686, 3638
DNA325687, 3640
DNA325688, 3641
DNA325689, 3642
DNA325690, 3643
DNA325691, 3645
DNA325692, 3646
DNA325693, 3648
DNA325694, 3650
DNA325695, 3652
DNA325696, 3654
DNA325697, 3656
DNA325698, 3658
DNA325699, 3659
DNA325700, 3660
DNA325701, 3662
DNA325702, 3663
DNA325703, 3665
DNA325704, 3669
DNA325705, 3671
DNA325706, 3672
DNA325707, 3674
DNA325708, 3676
DNA325709, 3680
DNA325710, 3681
DNA325711, 3683
DNA325712, 3685
DNA325713, 3687
DNA325714, 3689
DNA325715, 3691
DNA325716, 3693
DNA325717, 3695
DNA325718, 3697
DNA325719, 3699
DNA325720, 3700
DNA325721, 3702
DNA325722, 3704
DNA325723, 3705
DNA325724, 3707
DNA325725, 3708
DNA325726, 3710
DNA325727, 3712
DNA325728, 3714
DNA325729, 3715
DNA325730, 3719
DNA325731, 3722
DNA325732, 3726
DNA325733, 3731
DNA325734, 3732
DNA325736, 3734
DNA325737, 3736
DNA325738, 3737
DNA325739, 3739

DNA325740, 3740
DNA325741, 3742
DNA325742, 3744
DNA325743, 3746
DNA325744, 3748
DNA325745, 3750
DNA325746, 3752
DNA325747, 3754
DNA325748, 3755
DNA325749, 3757
DNA325750, 3759
DNA325751, 3761
DNA325752, 3765
DNA325753, 3766
DNA325754, 3767
DNA325755, 3769
DNA325756, 3771
DNA325757, 3772
DNA325758, 3773
DNA325759, 3774
DNA325760, 3775
DNA325761, 3779
DNA325762, 3781
DNA325763, 3783
DNA325764, 3785
DNA325765, 3787
DNA325766, 3788
DNA325767, 3790
DNA325768, 3792
DNA325769, 3794
DNA325770, 3796
DNA325771, 3797
DNA325772, 3798
DNA325773, 3800
DNA325775, 3802
DNA325776, 3804
DNA325777, 3805
DNA325778, 3807
DNA325779, 3809
DNA325780, 3810
DNA325781, 3812
DNA325782, 3814
DNA325783, 3816
DNA325784, 3818
DNA325785, 3819
DNA325786, 3821
DNA325787, 3825
DNA325788, 3826
DNA325789, 3829
DNA325790, 3831
DNA325791, 3833
DNA325792, 3834
DNA325793, 3835
DNA325794, 3836
DNA325795, 3837
DNA325796, 3839

DNA325797, 3841
DNA325798, 3843
DNA325799, 3845
DNA325800, 3847
DNA325801, 3849
DNA325802, 3851
DNA325803, 3853
DNA325804, 3855
DNA325805, 3856
DNA325806, 3857
DNA325807, 3859
DNA325808, 3861
DNA325809, 3862
DNA325810, 3868
DNA325811, 3869
DNA325812, 3870
DNA325813, 3872
DNA325814, 3874
DNA325815, 3876
DNA325816, 3877
DNA325817, 3878
DNA325818, 3880
DNA325819, 3881
DNA325820, 3883
DNA325821, 3884
DNA325822, 3886
DNA325823, 3889
DNA325824, 3891
DNA325825, 3893
DNA325826, 3895
DNA325827, 3898
DNA325828, 3902
DNA325829, 3903
DNA325830, 3904
DNA325831, 3906
DNA325832, 3908
DNA325833, 3910
DNA325834, 3914
DNA325835, 3916
DNA325836, 3917
DNA325837, 3918
DNA325838, 3920
DNA325839, 3921
DNA325840, 3923
DNA325841, 3924
DNA325842, 3925
DNA325843, 3926
DNA325844, 3928
DNA325845, 3930
DNA325847, 3931
DNA325848, 3932
DNA325849, 3933
DNA325850, 3935
DNA325851, 3937
DNA325852, 3938
DNA325853, 3940

DNA325854, 3942

DNA325855, 3944

DNA325856, 3946

DNA325857, 3948

DNA325858, 3949

DNA325859, 3950

DNA325860, 3951

DNA325861, 3953

DNA325862, 3955

DNA325863, 3957

DNA325864, 3958

DNA325865, 3959

DNA325866, 3960

DNA325867, 3964

DNA325868, 3966

DNA325869, 3967

DNA325870, 3968

DNA325871, 3969

DNA325872, 3971

DNA325873, 3973

DNA325874, 3975

DNA325875, 3978

DNA325876, 3980

DNA325877, 3981

DNA325878, 3983

DNA325879, 3986

DNA325880, 3987

DNA325881, 3988

DNA325882, 3990

DNA325883, 3991

DNA325884, 3994

DNA325885, 3996

DNA325886, 3997

DNA325887, 3999

DNA325888, 4001

DNA325889, 4003

DNA325890, 4005

DNA325891, 4006

DNA325892, 4008

DNA325893, 4010

DNA325894, 4012

DNA325895, 4014

DNA325896, 4016

DNA325897, 4018

DNA325898, 4019

DNA325899, 4020

DNA325900, 4022

DNA325901, 4024

DNA325902, 4025

DNA325903, 4027

DNA325904, 4029

DNA325905, 4031

DNA325906, 4032

DNA325907, 4033

DNA325908, 4034

DNA325909, 4035

DNA325910, 4037

DNA325911, 4039

DNA325912, 4040

DNA325913, 4044

DNA325914, 4045

DNA325915, 4046

DNA325916, 4048

DNA325917, 4050

DNA325918, 4052

DNA325919, 4054

DNA325920, 4055

DNA325921, 4057

DNA325922, 4061

DNA325923, 4063

DNA325924, 4065

DNA325925, 4067

DNA325926, 4068

DNA325927, 4069

DNA325928, 4071

DNA325929, 4072

DNA325930, 4073

DNA325931, 4074

DNA325932, 4075

DNA325933, 4077

DNA325934, 4081

DNA325935, 4082

DNA325936, 4084

DNA325937, 4086

DNA325938, 4088

DNA325939, 4090

DNA325940, 4091

DNA325941, 4092

DNA325942, 4094

DNA325943, 4097

DNA325944, 4098

DNA325945, 4100

DNA325946, 4101

DNA325947, 4103

DNA325948, 4105

DNA325949, 4106

DNA325950, 4108

DNA325951, 4112

DNA325952, 4114

DNA325953, 4115

DNA325954, 4116

DNA325955, 4118

DNA325956, 4119

DNA325957, 4120

DNA325958, 4121

DNA325959, 4122

DNA325960, 4123

DNA325961, 4124

DNA325962, 4125

DNA325963, 4127

DNA325964, 4129

DNA325965, 4130

DNA325966, 4132	DNA326022, 4239
DNA325967, 4133	DNA326023, 4241
DNA325968, 4134	DNA326024, 4244
DNA325969, 4135	DNA326025, 4245
DNA325970, 4136	DNA326026, 4246
DNA325971, 4138	DNA326027, 4248
DNA325972, 4139	DNA326028, 4250
DNA325973, 4143	DNA326029, 4251
DNA325974, 4145	DNA326030, 4252
DNA325975, 4147	DNA326031, 4254
DNA325976, 4148	DNA326032, 4256
DNA325977, 4150	DNA326033, 4257
DNA325978, 4152	DNA326034, 4259
DNA325979, 4154	DNA326035, 4261
DNA325980, 4156	DNA326036, 4263
DNA325981, 4157	DNA326037, 4269
DNA325982, 4159	DNA326038, 4270
DNA325983, 4160	DNA326039, 4272
DNA325984, 4163	DNA326040, 4273
DNA325985, 4165	DNA326041, 4275
DNA325986, 4167	DNA326042, 4277
DNA325987, 4168	DNA326043, 4278
DNA325988, 4172	DNA326044, 4279
DNA325989, 4174	DNA326045, 4281
DNA325990, 4176	DNA326046, 4282
DNA325991, 4178	DNA326047, 4283
DNA325992, 4180	DNA326048, 4285
DNA325993, 4184	DNA326049, 4286
DNA325994, 4186	DNA326050, 4287
DNA325995, 4187	DNA326051, 4289
DNA325996, 4189	DNA326052, 4290
DNA325997, 4191	DNA326053, 4292
DNA325998, 4193	DNA326054, 4293
DNA325999, 4195	DNA326055, 4295
DNA326000, 4197	DNA326056, 4296
DNA326001, 4199	DNA326057, 4298
DNA326002, 4200	DNA326058, 4302
DNA326003, 4202	DNA326059, 4304
DNA326004, 4203	DNA326060, 4307
DNA326005, 4205	DNA326061, 4309
DNA326006, 4207	DNA326062, 4310
DNA326007, 4210	DNA326063, 4311
DNA326008, 4211	DNA326064, 4312
DNA326009, 4213	DNA326065, 4314
DNA326010, 4216	DNA326066, 4315
DNA326011, 4218	DNA326067, 4317
DNA326012, 4220	DNA326068, 4319
DNA326013, 4221	DNA326069, 4322
DNA326014, 4222	DNA326070, 4323
DNA326015, 4226	DNA326071, 4325
DNA326016, 4228	DNA326072, 4326
DNA326017, 4230	DNA326073, 4327
DNA326018, 4232	DNA326074, 4329
DNA326019, 4234	DNA326075, 4331
DNA326020, 4236	DNA326076, 4333
DNA326021, 4237	DNA326077, 4334

DNA326078, 4335	DNA326134, 4444
DNA326079, 4337	DNA326135, 4448
DNA326080, 4338	DNA326136, 4449
DNA326081, 4340	DNA326137, 4451
DNA326082, 4342	DNA326138, 4453
DNA326083, 4344	DNA326139, 4454
DNA326084, 4346	DNA326140, 4456
DNA326085, 4348	DNA326141, 4458
DNA326086, 4350	DNA326142, 4460
DNA326087, 4352	DNA326143, 4461
DNA326088, 4353	DNA326144, 4462
DNA326089, 4354	DNA326145, 4463
DNA326090, 4356	DNA326146, 4465
DNA326091, 4358	DNA326147, 4467
DNA326092, 4364	DNA326148, 4468
DNA326093, 4366	DNA326149, 4470
DNA326094, 4368	DNA326150, 4472
DNA326095, 4372	DNA326151, 4474
DNA326096, 4376	DNA326152, 4478
DNA326097, 4378	DNA326153, 4479
DNA326098, 4380	DNA326154, 4480
DNA326099, 4382	DNA326155, 4482
DNA326100, 4384	DNA326156, 4483
DNA326101, 4386	DNA326157, 4484
DNA326102, 4388	DNA326158, 4485
DNA326103, 4390	DNA326159, 4489
DNA326104, 4392	DNA326160, 4490
DNA326105, 4394	DNA326161, 4491
DNA326106, 4396	DNA326162, 4493
DNA326107, 4398	DNA326163, 4495
DNA326108, 4400	DNA326164, 4497
DNA326109, 4402	DNA326165, 4498
DNA326110, 4404	DNA326166, 4500
DNA326111, 4406	DNA326167, 4502
DNA326112, 4408	DNA326168, 4504
DNA326113, 4410	DNA326169, 4505
DNA326114, 4411	DNA326170, 4509
DNA326115, 4413	DNA326171, 4511
DNA326116, 4414	DNA326172, 4513
DNA326117, 4416	DNA326173, 4514
DNA326118, 4418	DNA326174, 4518
DNA326119, 4420	DNA326175, 4522
DNA326120, 4423	DNA326176, 4524
DNA326121, 4425	DNA326177, 4526
DNA326122, 4426	DNA326178, 4527
DNA326123, 4427	DNA326179, 4528
DNA326124, 4429	DNA326180, 4532
DNA326125, 4430	DNA326181, 4534
DNA326126, 4431	DNA326182, 4535
DNA326127, 4432	DNA326183, 4537
DNA326128, 4434	DNA326184, 4538
DNA326129, 4435	DNA326185, 4539
DNA326130, 4436	DNA326186, 4541
DNA326131, 4438	DNA326187, 4543
DNA326132, 4440	DNA326188, 4544
DNA326133, 4442	DNA326189, 4545

DNA326190, 4547
DNA326191, 4549
DNA326192, 4551
DNA326193, 4553
DNA326194, 4555
DNA326195, 4556
DNA326196, 4558
DNA326197, 4560
DNA326198, 4561
DNA326199, 4562
DNA326200, 4566
DNA326201, 4570
DNA326202, 4571
DNA326203, 4573
DNA326204, 4577
DNA326205, 4581
DNA326206, 4583
DNA326207, 4584
DNA326208, 4586
DNA326209, 4588
DNA326210, 4590
DNA326211, 4592
DNA326212, 4594
DNA326213, 4596
DNA326214, 4597
DNA326215, 4599
DNA326216, 4600
DNA326217, 4602
DNA326218, 4604
DNA326219, 4606
DNA326220, 4608
DNA326221, 4610
DNA326222, 4612
DNA326223, 4614
DNA326224, 4616
DNA326225, 4617
DNA326226, 4619
DNA326227, 4621
DNA326228, 4622
DNA326229, 4624
DNA326230, 4628
DNA326231, 4630
DNA326232, 4632
DNA326233, 4633
DNA326234, 4635
DNA326235, 4637
DNA326236, 4638
DNA326237, 4640
DNA326238, 4641
DNA326239, 4642
DNA326240, 4644
DNA326241, 4645
DNA326242, 4646
DNA326243, 4647
DNA326244, 4648
DNA326245, 4650

DNA326246, 4651
DNA326247, 4653
DNA326248, 4654
DNA326249, 4656
DNA326250, 4658
DNA326251, 4659
DNA326252, 4661
DNA326253, 4663
DNA326254, 4665
DNA326255, 4667
DNA326256, 4669
DNA326257, 4671
DNA326258, 4672
DNA326259, 4674
DNA326260, 4675
DNA326261, 4677
DNA326262, 4678
DNA326263, 4680
DNA326264, 4682
DNA326265, 4684
DNA326266, 4686
DNA326267, 4689
DNA326268, 4691
DNA326269, 4693
DNA326270, 4694
DNA326271, 4695
DNA326272, 4696
DNA326273, 4697
DNA326274, 4701
DNA326275, 4703
DNA326276, 4704
DNA326277, 4706
DNA326278, 4707
DNA326279, 4710
DNA326280, 4712
DNA326281, 4713
DNA326282, 4716
DNA326283, 4718
DNA326284, 4721
DNA326285, 4723
DNA326286, 4724
DNA326287, 4725
DNA326288, 4727
DNA326289, 4730
DNA326290, 4732
DNA326291, 4734
DNA326292, 4735
DNA326293, 4737
DNA326294, 4739
DNA326295, 4741
DNA326296, 4744
DNA326297, 4745
DNA326298, 4749
DNA326299, 4750
DNA326300, 4751
DNA326301, 4752

DNA326302, 4754
DNA326303, 4755
DNA326304, 4757
DNA326305, 4758
DNA326306, 4760
DNA326307, 4761
DNA326308, 4763
DNA326309, 4765
DNA326310, 4767
DNA326311, 4768
DNA326312, 4769
DNA326313, 4771
DNA326314, 4773
DNA326315, 4775
DNA326316, 4777
DNA326317, 4780
DNA326318, 4784
DNA326319, 4786
DNA326320, 4788
DNA326321, 4790
DNA326322, 4792
DNA326323, 4794
DNA326324, 4798
DNA326325, 4800
DNA326326, 4801
DNA326327, 4803
DNA326328, 4807
DNA326329, 4809
DNA326330, 4810
DNA326331, 4814
DNA326332, 4816
DNA326333, 4818
DNA326334, 4819
DNA326335, 4822
DNA326336, 4824
DNA326337, 4825
DNA326338, 4826
DNA326339, 4827
DNA326340, 4829
DNA326341, 4830
DNA326342, 4832
DNA326343, 4834
DNA326344, 4836
DNA326345, 4838
DNA326346, 4840
DNA326347, 4847
DNA326348, 4849
DNA326349, 4850
DNA326350, 4852
DNA326351, 4856
DNA326352, 4857
DNA326353, 4859
DNA326354, 4861
DNA326355, 4863
DNA326356, 4864
DNA326357, 4865

DNA326358, 4867
DNA326359, 4869
DNA326360, 4871
DNA326361, 4873
DNA326362, 4875
DNA326363, 4880
DNA326364, 4881
DNA326365, 4883
DNA326366, 4885
DNA326367, 4893
DNA326368, 4895
DNA326369, 4897
DNA326370, 4902
DNA326371, 4905
DNA326372, 4906
DNA326373, 4908
DNA326374, 4910
DNA326375, 4911
DNA326376, 4913
DNA326377, 4915
DNA326378, 4916
DNA326379, 4917
DNA326380, 4921
DNA326381, 4923
DNA326382, 4924
DNA326383, 4926
DNA326384, 4927
DNA326385, 4929
DNA326386, 4931
DNA326387, 4933
DNA326388, 4935
DNA326389, 4938
DNA326390, 4941
DNA326391, 4942
DNA326392, 4943
DNA326393, 4944
DNA326394, 4945
DNA326395, 4946
DNA326396, 4948
DNA326397, 4950
DNA326398, 4951
DNA326399, 4955
DNA326400, 4957
DNA326401, 4958
DNA326402, 4960
DNA326403, 4962
DNA326404, 4965
DNA326405, 4967
DNA326406, 4969
DNA326407, 4971
DNA326408, 4973
DNA326409, 4977
DNA326410, 4978
DNA326411, 4980
DNA326412, 4982
DNA326413, 4984

DNA326414, 4987

DNA326415, 4988

DNA326416, 4989

DNA326417, 4991

DNA326418, 4992

DNA326419, 4994

DNA326420, 4995

DNA326421, 4996

DNA326422, 4998

DNA326423, 4999

DNA326424, 5000

DNA326425, 5001

DNA326426, 5002

DNA326427, 5004

DNA326428, 5006

DNA326429, 5008

DNA326430, 5010

DNA326431, 5011

DNA326432, 5013

DNA326433, 5016

DNA326434, 5018

DNA326435, 5019

DNA326436, 5020

DNA326437, 5021

DNA326438, 5022

DNA326439, 5025

DNA326440, 5026

DNA326441, 5027

DNA326442, 5028

DNA326443, 5030

DNA326444, 5031

DNA326445, 5032

DNA326446, 5034

DNA326447, 5036

DNA326448, 5037

DNA326449, 5042

DNA326450, 5043

DNA326451, 5045

DNA326452, 5046

DNA326453, 5048

DNA326454, 5049

DNA326455, 5054

DNA326456, 5055

DNA326457, 5058

DNA326458, 5060

DNA326459, 5062

DNA326460, 5064

DNA326461, 5065

DNA326462, 5066

DNA326463, 5067

DNA326464, 5069

DNA326465, 5071

DNA326466, 5072

DNA326467, 5074

DNA326468, 5075

DNA326469, 5076

DNA326470, 5078

DNA326471, 5080

DNA326472, 5082

DNA326473, 5083

DNA326474, 5084

DNA326475, 5086

DNA326476, 5088

DNA326477, 5089

DNA326478, 5090

DNA326479, 5092

DNA326480, 5093

DNA326481, 5095

DNA326482, 5097

DNA326483, 5098

DNA326484, 5100

DNA326485, 5102

DNA326486, 5104

DNA326487, 5106

DNA326488, 5108

DNA326489, 5109

DNA326490, 5110

DNA326491, 5112

DNA326492, 5113

DNA326493, 5114

DNA326494, 5117

DNA326495, 5119

DNA326496, 5120

DNA326497, 5122

DNA326498, 5124

DNA326499, 5126

DNA326500, 5128

DNA326501, 5130

DNA326502, 5131

DNA326503, 5132

DNA326504, 5134

DNA326505, 5135

DNA326506, 5137

DNA326507, 5138

DNA326508, 5140

DNA326509, 5141

DNA326510, 5143

DNA326511, 5145

DNA326512, 5148

DNA326513, 5150

DNA326514, 5152

DNA326515, 5155

DNA326516, 5157

DNA326517, 5159

DNA326518, 5160

DNA326519, 5161

DNA326520, 5163

DNA326521, 5165

DNA326522, 5166

DNA326523, 5168

DNA326524, 5169

DNA326525, 5171

DNA326526, 5173
DNA326527, 5175
DNA326528, 5176
DNA326529, 5178
DNA326530, 5180
DNA326531, 5181
DNA326532, 5183
DNA326533, 5184
DNA326534, 5186
DNA326535, 5188
DNA326536, 5190
DNA326537, 5192
DNA326538, 5194
DNA326539, 5195
DNA326540, 5196
DNA326541, 5197
DNA326542, 5203
DNA326543, 5205
DNA326544, 5208
DNA326546, 5210
DNA326547, 5212
DNA326548, 5213
DNA326549, 5214
DNA326550, 5216
DNA326551, 5218
DNA326552, 5219
DNA326553, 5221
DNA326554, 5222
DNA326555, 5223
DNA326556, 5225
DNA326557, 5226
DNA326558, 5227
DNA326559, 5229
DNA326560, 5230
DNA326561, 5236
DNA326562, 5237
DNA326563, 5239
DNA326564, 5240
DNA326565, 5241
DNA326566, 5243
DNA326567, 5244
DNA326568, 5246
DNA326569, 5247
DNA326570, 5248
DNA326571, 5250
DNA326572, 5252
DNA326573, 5254
DNA326574, 5256
DNA326575, 5257
DNA326576, 5260
DNA326577, 5261
DNA326578, 5262
DNA326579, 5264
DNA326580, 5266
DNA326581, 5267
DNA326582, 5269

DNA326583, 5270
DNA326584, 5274
DNA326585, 5276
DNA326586, 5281
DNA326587, 5283
DNA326588, 5285
DNA326589, 5286
DNA326590, 5288
DNA326591, 5290
DNA326592, 5292
DNA326593, 5294
DNA326594, 5295
DNA326595, 5297
DNA326596, 5300
DNA326597, 5302
DNA326598, 5303
DNA326599, 5305
DNA326600, 5307
DNA326601, 5308
DNA326602, 5310
DNA326603, 5311
DNA326604, 5314
DNA326605, 5316
DNA326606, 5317
DNA326607, 5319
DNA326608, 5321
DNA326609, 5323
DNA326610, 5325
DNA326611, 5326
DNA326612, 5330
DNA326613, 5331
DNA326614, 5332
DNA326615, 5334
DNA326616, 5336
DNA326617, 5337
DNA326618, 5338
DNA326619, 5339
DNA326620, 5341
DNA326621, 5343
DNA326622, 5345
DNA326623, 5347
DNA326624, 5349
DNA326625, 5350
DNA326626, 5354
DNA326627, 5355
DNA326628, 5357
DNA326629, 5358
DNA326630, 5360
DNA326631, 5362
DNA326632, 5364
DNA326633, 5366
DNA326634, 5367
DNA326635, 5369
DNA326636, 5370
DNA326637, 5371
DNA326638, 5372

DNA326639, 5374
DNA326640, 5376
DNA326641, 5378
DNA326642, 5379
DNA326643, 5380
DNA326644, 5382
DNA326645, 5383
DNA326646, 5384
DNA326647, 5385
DNA326648, 5389
DNA326649, 5391
DNA326650, 5393
DNA326651, 5395
DNA326652, 5396
DNA326653, 5398
DNA326654, 5399
DNA326655, 5401
DNA326656, 5403
DNA326657, 5404
DNA326658, 5406
DNA326659, 5408
DNA326660, 5409
DNA326661, 5411
DNA326662, 5413
DNA326663, 5415
DNA326664, 5417
DNA326665, 5419
DNA326666, 5423
DNA326667, 5425
DNA326668, 5428
DNA326669, 5430
DNA326670, 5432
DNA326671, 5436
DNA326672, 5438
DNA326673, 5439
DNA326674, 5440
DNA326675, 5443
DNA326676, 5444
DNA326677, 5445
DNA326678, 5446
DNA326679, 5447
DNA326680, 5450
DNA326681, 5451
DNA326682, 5453
DNA326683, 5454
DNA326684, 5456
DNA326685, 5458
DNA326686, 5460
DNA326687, 5461
DNA326688, 5462
DNA326689, 5463
DNA326690, 5465
DNA326691, 5466
DNA326692, 5468
DNA326693, 5470
DNA326694, 5472

DNA326695, 5474
DNA326696, 5478
DNA326697, 5480
DNA326698, 5482
DNA326699, 5483
DNA326700, 5484
DNA326701, 5485
DNA326702, 5486
DNA326703, 5487
DNA326704, 5488
DNA326705, 5489
DNA326706, 5491
DNA326707, 5492
DNA326708, 5496
DNA326709, 5497
DNA326710, 5499
DNA326711, 5501
DNA326712, 5508
DNA326713, 5510
DNA326714, 5519
DNA326715, 5521
DNA326716, 5522
DNA326717, 5525
DNA326718, 5527
DNA326719, 5528
DNA326720, 5529
DNA326721, 5530
DNA326722, 5531
DNA326723, 5532
DNA326724, 5534
DNA326725, 5536
DNA326726, 5537
DNA326727, 5539
DNA326728, 5541
DNA326729, 5544
DNA326730, 5546
DNA326731, 5548
DNA326732, 5549
DNA326733, 5552
DNA326734, 5554
DNA326735, 5556
DNA326736, 5558
DNA326737, 5560
DNA326738, 5564
DNA326739, 5566
DNA326740, 5570
DNA326741, 5571
DNA326742, 5573
DNA326743, 5574
DNA326744, 5578
DNA326745, 5580
DNA326746, 5582
DNA326747, 5584
DNA326748, 5586
DNA326749, 5588
DNA326750, 5592

DNA326751, 5595
DNA326752, 5597
DNA326753, 5598
DNA326754, 5600
DNA326755, 5602
DNA326756, 5603
DNA326757, 5605
DNA326758, 5607
DNA326759, 5608
DNA326760, 5610
DNA326761, 5612
DNA326762, 5613
DNA326763, 5617
DNA326764, 5619
DNA326765, 5621
DNA326766, 5623
DNA326767, 5629
DNA326768, 5631
DNA326769, 5633
DNA326770, 5635
DNA326771, 5636
DNA326772, 5642
DNA326773, 5644
DNA326774, 5646
DNA326775, 5647
DNA326776, 5648
DNA326777, 5650
DNA326778, 5652
DNA326779, 5656
DNA326780, 5658
DNA326781, 5660
DNA326782, 5661
DNA326783, 5663
DNA326784, 5665
DNA326785, 5667
DNA326786, 5670
DNA326787, 5671
DNA326788, 5673
DNA326789, 5674
DNA326790, 5675
DNA326791, 5678
DNA326792, 5683
DNA326793, 5687
DNA326794, 5688
DNA326795, 5689
DNA326796, 5691
DNA326797, 5693
DNA326798, 5695
DNA326799, 5696
DNA326800, 5698
DNA326801, 5700
DNA326802, 5701
DNA326803, 5705
DNA326804, 5706
DNA326805, 5708
DNA326806, 5710

DNA326807, 5712
DNA326808, 5713
DNA326809, 5715
DNA326810, 5717
DNA326811, 5719
DNA326812, 5723
DNA326813, 5725
DNA326814, 5727
DNA326815, 5728
DNA326816, 5729
DNA326817, 5731
DNA326818, 5733
DNA326819, 5736
DNA326820, 5740
DNA326821, 5742
DNA326822, 5744
DNA326823, 5749
DNA326824, 5750
DNA326825, 5752
DNA326826, 5754
DNA326827, 5756
DNA326828, 5757
DNA326829, 5759
DNA326830, 5762
DNA326831, 5763
DNA326832, 5765
DNA326833, 5766
DNA326834, 5768
DNA326835, 5769
DNA326836, 5773
DNA326837, 5776
DNA326838, 5778
DNA326839, 5779
DNA326840, 5781
DNA326841, 5783
DNA326842, 5787
DNA326843, 5793
DNA326844, 5794
DNA326845, 5795
DNA326846, 5796
DNA326847, 5798
DNA326848, 5800
DNA326849, 5802
DNA326850, 5804
DNA326851, 5806
DNA326852, 5808
DNA326853, 5809
DNA326854, 5811
DNA326855, 5813
DNA326856, 5816
DNA326857, 5818
DNA326858, 5819
DNA326859, 5821
DNA326860, 5823
DNA326861, 5824
DNA326862, 5826

DNA326863, 5828
DNA326864, 5832
DNA326865, 5834
DNA326866, 5838
DNA326867, 5840
DNA326868, 5842
DNA326869, 5846
DNA326870, 5847
DNA326871, 5849
DNA326872, 5851
DNA326873, 5853
DNA326874, 5855
DNA326875, 5857
DNA326876, 5859
DNA326877, 5861
DNA326878, 5863
DNA326879, 5865
DNA326880, 5867
DNA326881, 5869
DNA326882, 5871
DNA326883, 5875
DNA326884, 5876
DNA326885, 5877
DNA326886, 5878
DNA326887, 5879
DNA326888, 5883
DNA326889, 5887
DNA326890, 5889
DNA326891, 5894
DNA326892, 5898
DNA326893, 5900
DNA326894, 5902
DNA326895, 5903
DNA326896, 5905
DNA326897, 5907
DNA326898, 5908
DNA326899, 5910
DNA326900, 5911
DNA326901, 5913
DNA326902, 5914
DNA326903, 5915
DNA326904, 5917
DNA326905, 5919
DNA326906, 5923
DNA326907, 5924
DNA326908, 5925
DNA326909, 5926
DNA326910, 5927
DNA326911, 5928
DNA326912, 5929
DNA326913, 5930
DNA326914, 5931
DNA326915, 5933
DNA326916, 5937
DNA326917, 5941
DNA326918, 5943

DNA326919, 5945
DNA326920, 5946
DNA326921, 5949
DNA326922, 5950
DNA326923, 5951
DNA326924, 5953
DNA326925, 5954
DNA326926, 5958
DNA326927, 5960
DNA326928, 5961
DNA326929, 5963
DNA326930, 5964
DNA326931, 5967
DNA326932, 5968
DNA326933, 5969
DNA326934, 5971
DNA326935, 5975
DNA326936, 5977
DNA326937, 5979
DNA326938, 5981
DNA326939, 5983
DNA326940, 5985
DNA326941, 5986
DNA326942, 5987
DNA326943, 5991
DNA326944, 5993
DNA326945, 5996
DNA326946, 5998
DNA326947, 5999
DNA326948, 6001
DNA326949, 6007
DNA326950, 6009
DNA326951, 6013
DNA326952, 6014
DNA326953, 6015
DNA326954, 6017
DNA326955, 6019
DNA326956, 6022
DNA326957, 6024
DNA326958, 6025
DNA326959, 6029
DNA326960, 6031
DNA326961, 6032
DNA326962, 6036
DNA326963, 6040
DNA326964, 6042
DNA326965, 6043
DNA326966, 6047
DNA326967, 6049
DNA326968, 6051
DNA326969, 6052
DNA326970, 6054
DNA326971, 6056
DNA326972, 6058
DNA326973, 6060
DNA326974, 6061

DNA326975, 6063	DNA327031, 6165
DNA326976, 6064	DNA327032, 6167
DNA326977, 6065	DNA327033, 6169
DNA326978, 6066	DNA327034, 6170
DNA326979, 6070	DNA327035, 6172
DNA326980, 6072	DNA327036, 6173
DNA326981, 6074	DNA327037, 6174
DNA326982, 6077	DNA327038, 6176
DNA326983, 6081	DNA327039, 6177
DNA326984, 6083	DNA327040, 6179
DNA326985, 6085	DNA327041, 6183
DNA326986, 6087	DNA327042, 6185
DNA326987, 6088	DNA327043, 6189
DNA326988, 6089	DNA327044, 6192
DNA326989, 6090	DNA327045, 6194
DNA326990, 6091	DNA327046, 6196
DNA326991, 6093	DNA327047, 6199
DNA326992, 6094	DNA327048, 6201
DNA326993, 6095	DNA327049, 6203
DNA326994, 6097	DNA327050, 6204
DNA326995, 6099	DNA327051, 6206
DNA326996, 6103	DNA327052, 6207
DNA326997, 6106	DNA327053, 6209
DNA326998, 6108	DNA327054, 6210
DNA326999, 6109	DNA327055, 6212
DNA327000, 6111	DNA327056, 6216
DNA327001, 6113	DNA327057, 6218
DNA327002, 6114	DNA327058, 6220
DNA327003, 6116	DNA327059, 6222
DNA327004, 6118	DNA327060, 6224
DNA327005, 6119	DNA327061, 6226
DNA327006, 6121	DNA327062, 6227
DNA327007, 6122	DNA327063, 6228
DNA327008, 6123	DNA327064, 6229
DNA327009, 6124	DNA327065, 6232
DNA327010, 6128	DNA327066, 6233
DNA327011, 6130	DNA327067, 6235
DNA327012, 6131	DNA327068, 6237
DNA327013, 6132	DNA327069, 6238
DNA327014, 6134	DNA327070, 6241
DNA327015, 6136	DNA327071, 6242
DNA327016, 6138	DNA327072, 6244
DNA327017, 6140	DNA327073, 6246
DNA327018, 6142	DNA327074, 6248
DNA327019, 6143	DNA327075, 6250
DNA327020, 6145	DNA327076, 6251
DNA327021, 6146	DNA327077, 6253
DNA327022, 6151	DNA327078, 6255
DNA327023, 6152	DNA327079, 6256
DNA327024, 6153	DNA327080, 6259
DNA327025, 6155	DNA327081, 6261
DNA327026, 6157	DNA327082, 6263
DNA327027, 6158	DNA327083, 6265
DNA327028, 6159	DNA327084, 6267
DNA327029, 6161	DNA327085, 6268
DNA327030, 6163	DNA327086, 6269

DNA327087, 6274
DNA327088, 6275
DNA327089, 6276
DNA327090, 6278
DNA327091, 6280
DNA327092, 6281
DNA327093, 6282
DNA327094, 6284
DNA327095, 6289
DNA327096, 6291
DNA327097, 6293
DNA327098, 6295
DNA327099, 6297
DNA327100, 6299
DNA327101, 6300
DNA327102, 6302
DNA327103, 6304
DNA327104, 6306
DNA327105, 6308
DNA327106, 6310
DNA327107, 6311
DNA327108, 6313
DNA327109, 6315
DNA327110, 6316
DNA327111, 6320
DNA327112, 6323
DNA327113, 6325
DNA327114, 6326
DNA327115, 6328
DNA327116, 6329
DNA327117, 6330
DNA327118, 6336
DNA327119, 6346
DNA327120, 6348
DNA327121, 6349
DNA327122, 6350
DNA327123, 6351
DNA327124, 6352
DNA327125, 6353
DNA327126, 6354
DNA327127, 6355
DNA66475, 4796
DNA75863, 3245
DNA76504, 6270
DNA79101, 3678
DNA79129, 1352
DNA79313, 3524
DNA82328, 624
DNA83020, 1671
DNA83022, 2495
DNA83046, 558
DNA83085, 173
DNA83141, 2361
DNA83154, 5590
DNA83170, 5679
DNA83180, 3476

DNA88051, 898
DNA88084, 5511
DNA88100, 1089
DNA88114, 3452
DNA88176, 3333
DNA88239, 5791
DNA88261, 4579
DNA88281, 5050
DNA88350, 2796
DNA88378, 4845
DNA88430, 4963
DNA88457, 5040
DNA88547, 1223
DNA88554, 4903
DNA88562, 2961
DNA88569, 5789
DNA89239, 1327
DNA89242, 2695
DNA97285, 3175
DNA97290, 4887
DNA97293, 4421
DNA97298, 5734
DNA97300, 4687

PRO Index (to Figure number)

PRO22262, 168
PRO22304, 147
PRO224, 5217
PRO22481, 6028
PRO22613, 5284
PRO22637, 4569
PRO2267, 5051
PRO2269, 61
PRO22771, 1625
PRO22897, 2339
PRO22907, 2634, 2636
PRO231, 329
PRO23123, 999
PRO23124, 949, 951
PRO23201, 2615
PRO23231, 6059
PRO23238, 5589
PRO23248, 2568
PRO23300, 586
PRO23362, 2194
PRO23364, 2948
PRO2355, 4512
PRO2373, 6125
PRO23746, 13
PRO23794, 5251
PRO23797, 2024, 2151
PRO23845, 5394
PRO23942, 429
PRO24002, 5748
PRO24021, 6317
PRO24028, 855
PRO24075, 4531
PRO24077, 5761
PRO24091, 978
PRO2420, 5790
PRO24831, 3307
PRO24851, 577
PRO24856, 125
PRO25115, 4878
PRO25245, 6312
PRO25302, 5882
PRO2537, 6271
PRO2549, 3679
PRO2551, 1353
PRO2555, 3525
PRO2560, 5096
PRO2561, 1672
PRO2569, 559
PRO2570, 2477
PRO2583, 174
PRO25845, 3298
PRO25849, 1853
PRO25881, 5498
PRO25985, 3156
PRO2604, 2362
PRO2610, 981

PRO2615, 5680
PRO26194, 82
PRO2622, 3477
PRO26228, 983
PRO2644, 5512
PRO2660, 3453
PRO2665, 922
PRO2672, 4550
PRO2685, 3334
PRO2711, 5792
PRO2718, 5282
PRO2719, 4580
PRO2720, 4219
PRO2732, 4175
PRO2733, 2443
PRO2758, 2797
PRO2769, 4846
PRO2788, 4964
PRO2799, 5041
PRO283, 3664
PRO2837, 1224
PRO2839, 4904
PRO2841, 3741, 3743
PRO2842, 2962
PRO2846, 3661
PRO2851, 177
PRO28687, 5880
PRO287, 1277
PRO2871, 3995
PRO2875, 2974
PRO2906, 1328
PRO2907, 2696
PRO292, 3134
PRO29371, 5329
PRO302, 4918
PRO303, 4409
PRO329, 504
PRO3344, 2484
PRO33679, 368
PRO33717, 3963
PRO33818, 2773
PRO34043, 6205
PRO34073, 3052
PRO34151, 5479
PRO34323, 5259
PRO34473, 2783
PRO3449, 3601
PRO34531, 6076
PRO34544, 1676
PRO34557, 4183
PRO34584, 6186
PRO36020, 1741
PRO36047, 1490
PRO36055, 1331
PRO36058, 1735
PRO36093, 2768

137

PRO36094, 2175
PRO36095, 3474
PRO36112, 4043
PRO36118, 6339
PRO36134, 2507
PRO36184, 6215
PRO36215, 3377
PRO36263, 6335
PRO36272, 357
PRO3629, 4355, 4357
PRO36305, 1960
PRO36316, 1958
PRO3632, 3176
PRO36328, 3977
PRO3637, 4888
PRO36372, 1829
PRO36373, 1129
PRO36382, 1447
PRO36383, 1512
PRO36384, 1516
PRO3640, 4422
PRO36417, 5948
PRO3645, 5735
PRO36468, 554
PRO3647, 4688
PRO36474, 5518
PRO36477, 3730
PRO36491, 3490
PRO36543, 3207
PRO36568, 3993
PRO36588, 410
PRO36680, 3005
PRO36693, 2656
PRO36723, 272
PRO36725, 106
PRO36735, 1096
PRO36787, 4096
PRO36800, 2459
PRO36808, 2671
PRO36841, 1919
PRO36852, 4821
PRO36872, 5922
PRO36879, 2263
PRO36881, 1792
PRO36891, 742
PRO36959, 2566
PRO36963, 5490
PRO36970, 3456
PRO37010, 1109
PRO37012, 5976
PRO37023, 2394
PRO37024, 5957
PRO37073, 2987
PRO37080, 5936
PRO37082, 475
PRO37083, 6160

PRO37091, 1765
PRO37109, 4225
PRO37221, 5746
PRO37234, 3499
PRO37256, 437
PRO37316, 3867
PRO37335, 1690
PRO37476, 6333
PRO37518, 4940
PRO37534, 4890
PRO37535, 385
PRO37540, 4990
PRO37547, 4743
PRO37551, 3221
PRO37555, 3594
PRO37557, 3629
PRO37628, 685
PRO37634, 3725
PRO37635, 2965
PRO37636, 1574
PRO37644, 6273
PRO37653, 815
PRO37654, 3589
PRO37667, 1887
PRO37669, 4171
PRO37675, 924
PRO37676, 158
PRO37697, 4627
PRO37709, 551
PRO37712, 5353
PRO37730, 2513
PRO37731, 2243
PRO37743, 5233
PRO37764, 4934
PRO37770, 1166
PRO37783, 1813
PRO37784, 3985
PRO37791, 4793
PRO37806, 498
PRO37811, 5682
PRO37905, 1943
PRO37935, 5772
PRO37937, 3721
PRO37938, 2461
PRO37951, 5164
PRO37954, 2692
PRO37961, 4343
PRO37967, 595
PRO37972, 3077
PRO37991, 804
PRO37992, 347
PRO38008, 699
PRO38010, 3459
PRO38021, 6217
PRO38022, 4162
PRO38028, 2667

PRO38038, 1509
PRO38040, 375
PRO38066, 5810
PRO38070, 1962
PRO38101, 5565
PRO38119, 6286
PRO38152, 6148
PRO38227, 4892
PRO38258, 793
PRO38284, 37
PRO38311, 4359
PRO38336, 4842
PRO38380, 6322
PRO38387, 2100
PRO38392, 2207
PRO38406, 6198
PRO38464, 4336
PRO38480, 4373
PRO38496, 5133
PRO38730, 6343
PRO38852, 4215
PRO39030, 6105
PRO39127, 6182
PRO39201, 4983
PRO39530, 4643
PRO39648, 3009
PRO39773, 2399
PRO4, 2535
PRO41882, 2366
PRO42022, 6225
PRO42208, 4519
PRO4348, 3577
PRO4379, 4179
PRO4426, 3632
PRO44999, 579
PRO45014, 2183
PRO4544, 219
PRO4547, 650
PRO4569, 5577
PRO4583, 189
PRO4586, 6071
PRO4605, 1450
PRO4650, 5273
PRO4666, 3682
PRO4676, 1599
PRO4710, 1678
PRO4729, 4709
PRO47354, 5516
PRO4738, 4799
PRO4749, 2983
PRO4756, 5377
PRO4763, 458
PRO4789, 5995
PRO4793, 3848
PRO4798, 2071
PRO4801, 3314

PRO4813, 5845
PRO4814, 4582
PRO4832, 1150
PRO4833, 2991
PRO48357, 1082
PRO4836, 4111
PRO4841, 3479
PRO4852, 5775
PRO4870, 3312
PRO4872, 6082
PRO4873, 3684
PRO4884, 1950
PRO4885, 6345
PRO4900, 3050
PRO4904, 4064, 5495
PRO4908, 1780
PRO4912, 2275
PRO4914, 617
PRO4917, 712
PRO4918, 765
PRO49182, 4705
PRO49209, 1371
PRO49256, 6004
PRO49262, 1628
PRO49278, 6069
PRO49298, 3330
PRO49310, 4720
PRO49316, 995
PRO49352, 6046
PRO49409, 500
PRO49457, 604
PRO49639, 4488
PRO49642, 343
PRO49648, 2741
PRO49653, 5628
PRO49675, 5886
PRO49685, 1156
PRO49722, 1317
PRO49726, 3469
PRO4984, 1909
PRO49869, 2694
PRO49875, 3778
PRO49879, 4375
PRO49881, 6319
PRO49883, 6258
PRO49888, 4899
PRO49967, 4578
PRO50083, 5891
PRO50095, 1133
PRO50134, 5940
PRO50165, 3114
PRO50409, 4209
PRO50438, 4266
PRO50481, 4748
PRO50582, 1927
PRO50596, 860

139

PRO50658, 4613
PRO50756, 3110
PRO51109, 1273
PRO51119, 6102
PRO51121, 3512
PRO51389, 2055
PRO51539, 200
PRO51565, 5514
PRO51586, 5147
PRO51744, 5057
PRO51767, 5388
PRO51771, 5435
PRO51775, 4363
PRO51815, 4371
PRO51836, 546
PRO51851, 1643
PRO51901, 2747
PRO52010, 4855
PRO52083, 1438
PRO52101, 5507
PRO52119, 5966
PRO52449, 403
PRO52492, 3416
PRO52537, 2924
PRO54594, 4204
PRO57307, 3327
PRO57854, 3102
PRO57901, 5594
PRO57917, 4060
PRO57942, 5815
PRO58006, 1855
PRO58042, 5313
PRO58046, 5123
PRO58092, 3899
PRO58118, 268
PRO58140, 1196
PRO58155, 5874
PRO58177, 1257
PRO58198, 6127
PRO58207, 3285
PRO58213, 1688
PRO58219, 1647
PRO58232, 5990
PRO58259, 1271
PRO58263, 2553
PRO58292, 5299
PRO58308, 1063
PRO58328, 1098
PRO58348, 3094
PRO58410, 3865
PRO58437, 2370
PRO58440, 3688
PRO58446, 5268
PRO58523, 3209
PRO58543, 747
PRO58606, 3300

PRO58642, 3897
PRO58702, 5207
PRO58784, 1100
PRO58837, 3592
PRO58875, 6240
PRO58939, 2877
PRO58974, 471
PRO58984, 1893
PRO58986, 1387
PRO58991, 5235
PRO58993, 1804
PRO59001, 3817
PRO59022, 6243
PRO59040, 1851
PRO59042, 3824
PRO59043, 3056
PRO59061, 6012
PRO59074, 2372
PRO59084, 3296
PRO59099, 128
PRO59136, 795
PRO59142, 5649, 5651
PRO59168, 6154
PRO59220, 5361
PRO59230, 2551
PRO59262, 3440
PRO59264, 5505
PRO59285, 6080
PRO59305, 4844
PRO59309, 4806
PRO59313, 959
PRO59321, 2663
PRO59328, 4912
PRO59332, 289
PRO59339, 5677
PRO59351, 2856
PRO59365, 1998
PRO59380, 2397
PRO59384, 752
PRO59441, 6139
PRO59491, 4508
PRO59504, 1094
PRO59544, 762
PRO59546, 230
PRO59558, 704
PRO59579, 2674
PRO59629, 3381
PRO59647, 3551
PRO59669, 5904
PRO59717, 2105
PRO59721, 3272
PRO59725, 462
PRO59785, 3728
PRO59868, 6188
PRO59895, 935
PRO59913, 1722

PRO60006, 2752   PRO61502, 3067
PRO60008, 3282   PRO61575, 5449
PRO60070, 4102   PRO61638, 349
PRO60115, 2807   PRO61661, 5024
PRO60121, 5053   PRO61679, 43
PRO60123, 3393   PRO61688, 2250
PRO60127, 2661   PRO61721, 2900
PRO6018, 395   PRO61744, 6141
PRO60207, 1698   PRO61761, 689
PRO60261, 520   PRO61799, 4361
PRO60298, 203   PRO61812, 2237
PRO60311, 3345   PRO61824, 2247
PRO60321, 2601   PRO61870, 1183
PRO60325, 4450   PRO61897, 2795
PRO60333, 5626   PRO61938, 6191
PRO60360, 2349   PRO61948, 4477
PRO60397, 882   PRO61977, 5278
PRO60438, 1867   PRO61999, 3913
PRO60475, 2735   PRO62039, 5116
PRO60499, 4262   PRO62065, 5893
PRO60542, 1397   PRO62069, 2865
PRO60575, 4087   PRO62075, 5442
PRO60579, 2181   PRO62077, 516
PRO60603, 5427   PRO62099, 4070
PRO60634, 3556   PRO62108, 2492
PRO60666, 3391   PRO62110, 4517
PRO60674, 5202   PRO62112, 5242
PRO60741, 1336   PRO62135, 1831
PRO60753, 872   PRO62153, 1171
PRO60781, 2715   PRO62212, 5524
PRO60800, 5073   PRO62225, 5179
PRO60815, 84   PRO62236, 2781
PRO60847, 3216   PRO62239, 750
PRO60860, 236   PRO62244, 2177
PRO60924, 3575   PRO62273, 3764
PRO60945, 5743   PRO62302, 5162
PRO60956, 1495   PRO62328, 6000
PRO60979, 4813   PRO62389, 181
PRO60991, 3087   PRO62466, 6327
PRO61085, 4268   PRO62500, 5407
PRO61113, 5070   PRO62518, 193
PRO61125, 195   PRO62529, 341
PRO61129, 5569   PRO62531, 5200
PRO61146, 397   PRO62574, 453
PRO61219, 4260   PRO62582, 5543
PRO61238, 3323   PRO62588, 6150
PRO61246, 5003   PRO62607, 637
PRO61250, 90   PRO62617, 2882
PRO61271, 6231   PRO62760, 931
PRO61308, 5575   PRO62770, 663
PRO61325, 781   PRO62780, 4666
PRO61327, 5786   PRO62786, 745
PRO61349, 5616   PRO62849, 293
PRO61458, 5422   PRO62852, 4301
PRO61470, 6288   PRO62882, 4321
PRO61498, 5739   PRO62893, 652

PRO62899, 5103

PRO62927, 865

PRO62981, 4717

PRO63000, 2724

PRO63009, 2233

PRO63052, 1972

PRO63068, 4565

PRO63082, 1680

PRO63226, 5238

PRO63253, 1905

PRO63299, 6341

PRO6360, 1077

PRO6373, 2213

PRO65, 848

PRO66265, 4670

PRO66275, 3901

PRO66279, 2127

PRO66282, 2129

PRO69461, 3302

PRO69463, 32

PRO69471, 3840

PRO69473, 3027, 3760

PRO69475, 2266

PRO69486, 5906

PRO69496, 2702

PRO69506, 1953

PRO69513, 5015

PRO69518, 5280

PRO69521, 1901

PRO69523, 3011

PRO69528, 3237

PRO69531, 906

PRO69533, 5669

PRO69541, 5655

PRO69542, 2764

PRO69549, 3461

PRO69554, 1583

PRO69560, 5686

PRO69561, 4920

PRO69568, 3254

PRO69584, 1970

PRO69595, 4243

PRO69617, 4521

PRO69635, 3138

PRO69674, 3219

PRO69681, 1301

PRO69682, 4901

PRO69684, 4779

PRO70011, 2704

PRO70138, 1968

PRO70258, 656

PRO70276, 4447

PRO70290, 2762

PRO703, 380

PRO70327, 1637, 1639

PRO70331, 6030

PRO70333, 541

PRO70383, 6035

PRO70385, 5551

PRO70393, 2008

PRO70433, 351

PRO70449, 4729

PRO70453, 3621

PRO70536, 1460

PRO70544, 2033

PRO70595, 2681

PRO70675, 991

PRO70694, 3786

PRO70703, 4976

PRO70754, 439

PRO70810, 5639

PRO70812, 4700

PRO70989, 3828, 3830

PRO70993, 1719

PRO71031, 3433, 3435

PRO71057, 2997

PRO71085, 5563

PRO71088, 1947

PRO71089, 5641

PRO71091, 2591

PRO71093, 370

PRO71095, 1964

PRO71096, 3888

PRO71097, 5831

PRO71103, 1148

PRO71106, 1875

PRO71111, 2436

PRO71112, 221

PRO71120, 3718

PRO71125, 1985, 1987

PRO71130, 4576

PRO71133, 2255

PRO71136, 2309

PRO71141, 4715

PRO71142, 1913

PRO71145, 6039

PRO71146, 372

PRO71211, 2343

PRO71242, 5974

PRO7143, 4986

PRO730, 4274

PRO7427, 2239

PRO7445, 2594

PRO80480, 5

PRO80481, 7

PRO80482, 9

PRO80483, 11

PRO80484, 16

PRO80485, 18

PRO80487, 21

PRO80488, 23

PRO80489, 25

142

PRO80490, 27	PRO80587, 240
PRO80492, 30	PRO80588, 242
PRO80493, 35	PRO80591, 246
PRO80494, 39	PRO80592, 248
PRO80497, 47	PRO80593, 252
PRO80498, 51	PRO80595, 255
PRO80499, 53	PRO80597, 258
PRO80501, 56	PRO80599, 261
PRO80505, 63	PRO80600, 263
PRO80506, 65	PRO80602, 266
PRO80510, 70	PRO80603, 270
PRO80511, 72	PRO80604, 274
PRO80512, 74	PRO80607, 278
PRO80517, 80	PRO80611, 283
PRO80518, 86	PRO80612, 285
PRO80519, 88	PRO80613, 287
PRO80520, 92	PRO80614, 291
PRO80521, 96	PRO80617, 297
PRO80524, 100	PRO80618, 299
PRO80527, 104	PRO80619, 301
PRO80528, 108	PRO80620, 303
PRO80530, 111	PRO80621, 305
PRO80533, 115	PRO80622, 307
PRO80534, 117	PRO80623, 309
PRO80535, 119	PRO80624, 311
PRO80536, 121	PRO80625, 313
PRO80537, 123	PRO80627, 316
PRO80542, 132	PRO80630, 320
PRO80547, 138	PRO80631, 322
PRO80550, 143	PRO80633, 325
PRO80553, 149	PRO80638, 333
PRO80554, 151	PRO80639, 335
PRO80555, 153	PRO80640, 337
PRO80557, 156	PRO80641, 339
PRO80558, 160	PRO80642, 345
PRO80559, 162	PRO80644, 355
PRO80560, 164	PRO80645, 359
PRO80561, 166	PRO80646, 362
PRO80562, 170	PRO80648, 365
PRO80563, 172	PRO80651, 378
PRO80565, 179	PRO80652, 382
PRO80567, 184	PRO80654, 387
PRO80568, 186	PRO80656, 390
PRO80570, 191	PRO80657, 393
PRO80571, 197	PRO80658, 399
PRO80574, 205	PRO80659, 401
PRO80575, 207	PRO80660, 405
PRO80576, 209	PRO80661, 407
PRO80579, 215	PRO80664, 413
PRO80580, 217	PRO80665, 415
PRO80581, 223	PRO80666, 417
PRO80582, 225	PRO80667, 419
PRO80583, 227	PRO80668, 421
PRO80584, 232	PRO80669, 423
PRO80585, 234	PRO80670, 425
PRO80586, 238	PRO80671, 427

PRO80672, 431
PRO80675, 435
PRO80676, 441
PRO80677, 443
PRO80678, 445
PRO80679, 447
PRO80680, 449
PRO80684, 456
PRO80685, 460
PRO80686, 464
PRO80688, 467
PRO80689, 469
PRO80693, 478
PRO80694, 480
PRO80695, 482
PRO80699, 489
PRO80700, 491
PRO80704, 496
PRO80705, 502
PRO80706, 506
PRO80707, 508
PRO80708, 510
PRO80709, 512
PRO80710, 514
PRO80711, 518
PRO80714, 526
PRO80715, 528
PRO80717, 533
PRO80719, 536
PRO80720, 539
PRO80725, 549
PRO80730, 563
PRO80734, 570
PRO80735, 572
PRO80736, 574
PRO80740, 584
PRO80741, 588
PRO80742, 590
PRO80745, 597
PRO80752, 607
PRO80753, 609
PRO80754, 611
PRO80755, 613
PRO80756, 615
PRO80759, 621
PRO80760, 623
PRO80761, 627
PRO80762, 629
PRO80763, 631
PRO80764, 633
PRO80765, 635
PRO80767, 640
PRO80770, 648
PRO80771, 654
PRO80772, 658
PRO80773, 660

PRO80775, 666
PRO80776, 668
PRO80778, 671
PRO80779, 673
PRO80780, 675
PRO80781, 677
PRO80782, 679
PRO80785, 687
PRO80786, 691
PRO80787, 693
PRO80788, 695
PRO80789, 697
PRO80790, 702
PRO80791, 708
PRO80792, 710
PRO80793, 714
PRO80796, 718
PRO80797, 720
PRO80798, 722
PRO80799, 724
PRO80802, 728
PRO80803, 730
PRO80804, 732
PRO80806, 735
PRO80807, 737
PRO80808, 739
PRO80811, 754
PRO80812, 756
PRO80813, 758
PRO80814, 760
PRO80816, 767
PRO80817, 769
PRO80820, 774
PRO80823, 778
PRO80827, 786
PRO80830, 790
PRO80832, 797
PRO80833, 799
PRO80835, 802
PRO80837, 809
PRO80838, 811
PRO80839, 813
PRO80842, 819
PRO80843, 821
PRO80846, 826
PRO80847, 828
PRO80848, 830
PRO80850, 835
PRO80851, 837
PRO80853, 840
PRO80856, 844
PRO80857, 846
PRO80860, 852
PRO80866, 863
PRO80868, 868
PRO80869, 870

PRO80870, 874   PRO80959, 1065
PRO80871, 876   PRO80960, 1069
PRO80873, 879   PRO80961, 1071
PRO80875, 884   PRO80962, 1073
PRO80876, 886   PRO80966, 1080
PRO80877, 888   PRO80967, 1084
PRO80878, 890   PRO80969, 1087
PRO80879, 892   PRO80970, 1092
PRO80881, 895   PRO80971, 1102
PRO80882, 897   PRO80972, 1104
PRO80883, 904   PRO80974, 1107
PRO80884, 908   PRO80975, 1111
PRO80888, 913   PRO80977, 1114
PRO80889, 915   PRO80978, 1116
PRO80890, 917   PRO80979, 1118
PRO80891, 919   PRO80983, 1124
PRO80900, 937   PRO80984, 1126
PRO80901, 939   PRO80988, 1135
PRO80903, 943   PRO80990, 1138
PRO80904, 945   PRO80993, 1142
PRO80905, 947   PRO80994, 1144
PRO80906, 953   PRO80995, 1152
PRO80908, 956   PRO80996, 1158
PRO80910, 961   PRO80997, 1160
PRO80911, 963   PRO80999, 1164
PRO80915, 972   PRO81000, 1168
PRO80916, 974   PRO81002, 1173
PRO80917, 976   PRO81003, 1175
PRO80920, 987   PRO81004, 1177
PRO80921, 989   PRO81005, 1179
PRO80924, 997   PRO81006, 1181
PRO80925, 1001   PRO81007, 1185
PRO80926, 1003   PRO81010, 1191
PRO80927, 1005   PRO81012, 1194
PRO80929, 1008   PRO81015, 1200
PRO80930, 1010   PRO81022, 1210
PRO80932, 1013   PRO81023, 1212
PRO80933, 1015   PRO81025, 1215
PRO80934, 1017   PRO81026, 1219
PRO80935, 1019   PRO81028, 1222
PRO80936, 1021   PRO81029, 1226
PRO80937, 1023   PRO81030, 1228
PRO80938, 1027   PRO81031, 1230
PRO80941, 1031   PRO81033, 1233
PRO80942, 1033   PRO81034, 1236
PRO80943, 1035   PRO81036, 1241
PRO80945, 1038   PRO81040, 1247
PRO80949, 1044   PRO81041, 1249
PRO80950, 1046   PRO81042, 1251
PRO80951, 1048   PRO81043, 1253
PRO80952, 1050   PRO81046, 1259
PRO80953, 1052   PRO81047, 1261
PRO80954, 1054   PRO81053, 1269
PRO80955, 1056   PRO81056, 1279
PRO80956, 1058   PRO81057, 1281
PRO80958, 1061   PRO81058, 1283

PRO81059, 1287
PRO81064, 1293
PRO81068, 1298
PRO81070, 1303
PRO81071, 1305
PRO81072, 1307
PRO81073, 1309
PRO81074, 1311
PRO81079, 1319
PRO81080, 1321
PRO81082, 1324
PRO81083, 1326
PRO81086, 1334
PRO81088, 1339
PRO81090, 1342
PRO81093, 1346
PRO81095, 1349
PRO81096, 1351
PRO81097, 1355
PRO81098, 1357
PRO81102, 1362
PRO81106, 1367
PRO81107, 1373
PRO81108, 1375
PRO81109, 1377
PRO81110, 1379
PRO81111, 1381
PRO81112, 1383
PRO81113, 1385
PRO81114, 1389
PRO81115, 1391
PRO81116, 1393
PRO81117, 1395
PRO81118, 1399
PRO81119, 1401
PRO81120, 1403
PRO81121, 1405
PRO81122, 1407
PRO81123, 1409
PRO81124, 1411
PRO81127, 1415
PRO81131, 1422
PRO81134, 1426
PRO81135, 1428
PRO81137, 1431
PRO81141, 1436
PRO81146, 1444
PRO81148, 1454
PRO81150, 1458
PRO81151, 1462
PRO81156, 1467
PRO81163, 1475
PRO81166, 1481
PRO81169, 1486
PRO81170, 1488
PRO81171, 1492

PRO81174, 1498
PRO81176, 1501
PRO81177, 1503
PRO81178, 1505
PRO81179, 1507
PRO81181, 1514
PRO81182, 1518
PRO81184, 1521
PRO81185, 1523
PRO81188, 1527
PRO81189, 1529
PRO81195, 1536
PRO81196, 1538
PRO81199, 1542
PRO81202, 1546
PRO81213, 1558
PRO81214, 1560
PRO81216, 1563
PRO81219, 1566
PRO81221, 1569
PRO81223, 1576
PRO81224, 1578
PRO81225, 1580
PRO81227, 1585
PRO81230, 1589
PRO81234, 1594
PRO81238, 1601
PRO81239, 1603
PRO81240, 1605
PRO81241, 1607
PRO81246, 1613
PRO81248, 1616
PRO81249, 1618
PRO81250, 1620
PRO81254, 1630
PRO81256, 1635
PRO81259, 1645
PRO81260, 1649
PRO81261, 1651
PRO81262, 1653
PRO81264, 1657
PRO81265, 1659
PRO81266, 1661
PRO81269, 1667
PRO81272, 1674
PRO81273, 1682
PRO81274, 1684
PRO81275, 1686
PRO81276, 1692
PRO81277, 1694
PRO81278, 1696
PRO81280, 1703
PRO81281, 1705
PRO81282, 1707
PRO81286, 1715
PRO81287, 1717

PRO81289, 1725   PRO81372, 1917
PRO81290, 1727   PRO81375, 1925
PRO81291, 1729   PRO81377, 1930
PRO81292, 1731   PRO81379, 1933
PRO81293, 1737   PRO81380, 1935
PRO81294, 1739   PRO81387, 1945
PRO81295, 1743   PRO81394, 1966
PRO81296, 1745   PRO81395, 1974
PRO81297, 1747   PRO81396, 1976
PRO81298, 1749   PRO81397, 1978
PRO81299, 1751   PRO81398, 1980
PRO81300, 1753   PRO81399, 1982
PRO81301, 1755   PRO81400, 1989
PRO81302, 1757   PRO81401, 1991
PRO81303, 1759   PRO81402, 1993
PRO81304, 1761   PRO81404, 1996
PRO81305, 1763   PRO81406, 2001
PRO81306, 1767   PRO81407, 2005
PRO81307, 1769   PRO81409, 2010
PRO81308, 1771   PRO81410, 2012
PRO81309, 1773   PRO81411, 2014
PRO81310, 1775   PRO81414, 2018
PRO81311, 1777   PRO81415, 2020
PRO81313, 1782   PRO81416, 2022
PRO81314, 1784   PRO81417, 2026
PRO81315, 1786   PRO81418, 2028
PRO81316, 1788   PRO81419, 2030
PRO81317, 1790   PRO81421, 2038
PRO81318, 1794   PRO81422, 2040
PRO81319, 1796   PRO81424, 2043
PRO81323, 1801   PRO81426, 2046
PRO81325, 1806   PRO81427, 2048
PRO81327, 1809   PRO81429, 2051
PRO81330, 1815   PRO81430, 2053
PRO81336, 1825   PRO81435, 2061
PRO81337, 1827   PRO81436, 2063
PRO81338, 1833   PRO81439, 2067
PRO81339, 1835   PRO81441, 2073
PRO81340, 1837   PRO81443, 2076
PRO81341, 1839   PRO81444, 2078
PRO81345, 1844   PRO81446, 2082
PRO81347, 1849   PRO81447, 2084
PRO81354, 1864   PRO81448, 2086
PRO81355, 1869   PRO81449, 2088
PRO81356, 1873   PRO81453, 2093
PRO81359, 1881   PRO81454, 2095
PRO81362, 1885   PRO81455, 2097
PRO81363, 1889   PRO81457, 2102
PRO81364, 1891   PRO81462, 2112
PRO81365, 1895   PRO81464, 2115
PRO81366, 1897   PRO81465, 2117
PRO81367, 1899   PRO81467, 2120
PRO81368, 1903   PRO81471, 2125
PRO81369, 1907   PRO81474, 2133
PRO81370, 1911   PRO81476, 2136
PRO81371, 1915   PRO81477, 2138

147

PRO81481, 2143	PRO81579, 2345
PRO81486, 2149	PRO81580, 2347
PRO81487, 2153	PRO81584, 2354
PRO81490, 2156	PRO81585, 2356
PRO81491, 2158	PRO81586, 2358
PRO81494, 2162	PRO81587, 2360
PRO81495, 2164	PRO81588, 2364
PRO81496, 2166	PRO81589, 2368
PRO81498, 2169	PRO81590, 2374
PRO81499, 2171	PRO81591, 2377
PRO81500, 2173	PRO81592, 2379
PRO81501, 2179	PRO81594, 2382
PRO81502, 2187	PRO81595, 2384
PRO81503, 2189	PRO81598, 2388
PRO81505, 2192	PRO81599, 2390
PRO81506, 2196	PRO81600, 2392
PRO81508, 2199	PRO81602, 2401
PRO81509, 2201	PRO81605, 2405
PRO81514, 2209	PRO81607, 2408
PRO81515, 2211	PRO81608, 2410
PRO81516, 2215	PRO81609, 2412
PRO81517, 2217	PRO81611, 2415
PRO81520, 2221	PRO81614, 2419
PRO81521, 2223	PRO81615, 2421
PRO81523, 2227	PRO81617, 2424
PRO81524, 2231	PRO81618, 2426
PRO81525, 2235	PRO81619, 2428
PRO81526, 2241	PRO81621, 2431
PRO81529, 2252	PRO81625, 2438
PRO81531, 2257	PRO81627, 2445
PRO81534, 2261	PRO81629, 2448
PRO81536, 2268	PRO81630, 2450
PRO81537, 2270	PRO81631, 2452
PRO81538, 2272	PRO81634, 2463
PRO81540, 2277	PRO81635, 2465
PRO81541, 2279	PRO81637, 2468
PRO81544, 2283	PRO81641, 2474
PRO81545, 2285	PRO81643, 2481
PRO81546, 2287	PRO81645, 2486
PRO81547, 2289	PRO81647, 2489
PRO81548, 2291	PRO81649, 2494
PRO81550, 2294	PRO81650, 2498
PRO81551, 2296	PRO81651, 2500
PRO81552, 2298	PRO81652, 2502
PRO81556, 2303	PRO81653, 2504
PRO81557, 2305	PRO81654, 2509
PRO81558, 2307	PRO81655, 2511
PRO81561, 2314	PRO81657, 2516
PRO81566, 2320	PRO81658, 2518
PRO81569, 2324	PRO81659, 2520
PRO81571, 2327	PRO81660, 2522
PRO81572, 2330	PRO81661, 2524
PRO81573, 2332	PRO81664, 2528
PRO81574, 2334	PRO81668, 2537
PRO81575, 2336	PRO81669, 2539
PRO81578, 2341	PRO81671, 2542

148

PRO81673, 2545
PRO81674, 2549
PRO81675, 2555
PRO81685, 2570
PRO81687, 2573
PRO81689, 2576
PRO81690, 2578
PRO81691, 2580
PRO81695, 2585
PRO81696, 2587
PRO81699, 2597
PRO81700, 2599
PRO81701, 2603
PRO81704, 2607
PRO81705, 2610
PRO81708, 2617
PRO81711, 2621
PRO81714, 2624
PRO81719, 2630
PRO81720, 2632
PRO81722, 2639
PRO81725, 2643
PRO81729, 2648
PRO81730, 2650
PRO81731, 2654
PRO81732, 2658
PRO81734, 2665
PRO81736, 2678
PRO81738, 2683
PRO81739, 2685
PRO81740, 2687
PRO81742, 2690
PRO81743, 2698
PRO81746, 2706
PRO81748, 2709
PRO81751, 2713
PRO81752, 2717
PRO81753, 2719
PRO81754, 2721
PRO81759, 2729
PRO81760, 2731
PRO81761, 2733
PRO81762, 2737
PRO81763, 2739
PRO81764, 2743
PRO81765, 2745
PRO81766, 2749
PRO81768, 2754
PRO81771, 2758
PRO81775, 2770
PRO81778, 2776
PRO81780, 2779
PRO81781, 2785
PRO81783, 2788
PRO81785, 2791
PRO81786, 2793

PRO81792, 2805
PRO81794, 2810
PRO81795, 2812
PRO81796, 2814
PRO81797, 2816
PRO81800, 2821
PRO81801, 2823
PRO81804, 2827
PRO81805, 2829
PRO81806, 2831
PRO81809, 2837
PRO81811, 2840
PRO81812, 2842
PRO81813, 2844
PRO81815, 2848
PRO81816, 2850
PRO81817, 2853
PRO81819, 2858
PRO81821, 2861
PRO81822, 2863
PRO81823, 2867
PRO81824, 2869
PRO81826, 2872
PRO81831, 2880
PRO81832, 2884
PRO81833, 2886
PRO81834, 2888
PRO81835, 2890
PRO81836, 2892
PRO81837, 2894
PRO81838, 2896
PRO81841, 2903
PRO81842, 2907
PRO81846, 2912
PRO81848, 2915
PRO81849, 2917
PRO81851, 2920
PRO81855, 2928
PRO81858, 2932
PRO81861, 2936
PRO81862, 2938
PRO81863, 2940
PRO81865, 2943
PRO81867, 2946
PRO81868, 2950
PRO81869, 2954
PRO81870, 2956
PRO81871, 2958
PRO81872, 2960
PRO81874, 2967
PRO81875, 2969
PRO81877, 2972
PRO81881, 2979
PRO81882, 2985
PRO81883, 2989
PRO81884, 2993

PRO81885, 2995
PRO81887, 3001
PRO81888, 3003
PRO81889, 3007
PRO81893, 3018
PRO81895, 3021
PRO81896, 3023
PRO81897, 3025
PRO81899, 3030
PRO81900, 3032
PRO81901, 3034
PRO81902, 3036
PRO81903, 3038
PRO81904, 3040
PRO81905, 3043
PRO81907, 3046
PRO81908, 3048
PRO81909, 3054
PRO81912, 3060
PRO81913, 3062
PRO81914, 3064
PRO81916, 3069
PRO81917, 3071
PRO81922, 3079
PRO81923, 3081
PRO81924, 3083
PRO81925, 3085
PRO81926, 3090
PRO81927, 3092
PRO81928, 3096
PRO81929, 3098
PRO81930, 3100
PRO81932, 3105
PRO81934, 3108
PRO81935, 3112
PRO81936, 3116
PRO81937, 3118
PRO81939, 3123
PRO81941, 3126
PRO81942, 3128
PRO81943, 3130
PRO81944, 3132
PRO81945, 3140
PRO81946, 3143
PRO81947, 3145
PRO81948, 3147
PRO81950, 3150
PRO81953, 3154
PRO81954, 3158
PRO81955, 3160
PRO81956, 3162
PRO81957, 3164
PRO81958, 3166
PRO81959, 3168
PRO81962, 3174
PRO81964, 3179

PRO81965, 3181
PRO81970, 3189
PRO81971, 3191
PRO81977, 3198
PRO81978, 3200
PRO81980, 3203
PRO81981, 3211
PRO81982, 3213
PRO81988, 3226
PRO81990, 3229
PRO81991, 3231
PRO81992, 3233
PRO81993, 3235
PRO81994, 3239
PRO81995, 3241
PRO81996, 3243
PRO81999, 3252
PRO82002, 3262
PRO82004, 3265
PRO82005, 3267
PRO82009, 3274
PRO82011, 3277
PRO82013, 3280
PRO82018, 3290
PRO82019, 3292
PRO82023, 3305
PRO82024, 3309
PRO82027, 3317
PRO82028, 3319
PRO82029, 3321
PRO82032, 3332
PRO82034, 3338
PRO82035, 3340
PRO82037, 3343
PRO82038, 3347
PRO82040, 3351
PRO82042, 3354
PRO82043, 3356
PRO82045, 3360
PRO82046, 3362
PRO82050, 3368
PRO82051, 3370
PRO82052, 3372
PRO82054, 3375
PRO82055, 3379
PRO82056, 3383
PRO82057, 3387
PRO82058, 3389
PRO82060, 3396
PRO82064, 3402
PRO82066, 3405
PRO82068, 3408
PRO82069, 3410
PRO82072, 3419
PRO82073, 3421
PRO82074, 3423

150

PRO82075, 3425
PRO82078, 3431
PRO82080, 3438
PRO82082, 3443
PRO82083, 3445
PRO82084, 3447
PRO82085, 3449
PRO82091, 3464
PRO82093, 3471
PRO82097, 3484
PRO82099, 3487
PRO82101, 3492
PRO82104, 3497
PRO82106, 3502
PRO82107, 3505
PRO82109, 3508
PRO82110, 3510
PRO82111, 3514
PRO82112, 3516
PRO82113, 3518
PRO82115, 3523
PRO82117, 3530
PRO82120, 3534
PRO82122, 3537
PRO82125, 3541
PRO82127, 3544
PRO82129, 3547
PRO82130, 3549
PRO82131, 3553
PRO82133, 3558
PRO82137, 3563
PRO82138, 3565
PRO82139, 3567
PRO82140, 3569
PRO82143, 3573
PRO82152, 3587
PRO82155, 3597
PRO82158, 3603
PRO82159, 3605
PRO82160, 3607
PRO82161, 3609
PRO82162, 3611
PRO82163, 3613
PRO82164, 3615
PRO82165, 3617
PRO82166, 3619
PRO82167, 3623
PRO82168, 3625
PRO82169, 3627
PRO82174, 3637
PRO82175, 3639
PRO82179, 3644
PRO82181, 3647
PRO82182, 3649
PRO82183, 3651
PRO82184, 3653

PRO82188, 3670
PRO82190, 3673
PRO82191, 3675
PRO82192, 3677
PRO82194, 3686
PRO82195, 3690
PRO82196, 3692
PRO82197, 3694
PRO82198, 3696
PRO82199, 3698
PRO82201, 3701
PRO82202, 3703
PRO82204, 3706
PRO82206, 3709
PRO82207, 3711
PRO82208, 3713
PRO82210, 3716
PRO82212, 3723
PRO82213, 3733
PRO82214, 3735
PRO82215, 3738
PRO82218, 3745
PRO82219, 3747
PRO82220, 3749
PRO82221, 3751
PRO82223, 3756
PRO82224, 3762
PRO82227, 3768
PRO82228, 3770
PRO82232, 3776
PRO82233, 3780
PRO82234, 3782
PRO82235, 3784
PRO82237, 3789
PRO82238, 3791
PRO82239, 3793
PRO82240, 3795
PRO82243, 3799
PRO82244, 3801
PRO82245, 3803
PRO82247, 3806
PRO82248, 3808
PRO82250, 3811
PRO82252, 3813
PRO82253, 3815
PRO82255, 3820
PRO82256, 3822
PRO82259, 3832
PRO82263, 3838
PRO82264, 3842
PRO82265, 3844
PRO82266, 3846
PRO82267, 3850
PRO82268, 3852
PRO82269, 3854
PRO82272, 3858

PRO82273, 3860	PRO82373, 4056
PRO82275, 3863	PRO82374, 4058
PRO82278, 3871	PRO82375, 4062
PRO82279, 3873	PRO82381, 4076
PRO82280, 3875	PRO82382, 4078
PRO82283, 3879	PRO82383, 4083
PRO82285, 3882	PRO82384, 4085
PRO82287, 3885	PRO82385, 4089
PRO82289, 3890	PRO82388, 4093
PRO82290, 3892	PRO82391, 4099
PRO82291, 3894	PRO82393, 4104
PRO82295, 3905	PRO82395, 4107
PRO82296, 3907	PRO82396, 4109
PRO82297, 3911	PRO82397, 4113
PRO82300, 3919	PRO82400, 4117
PRO82302, 3922	PRO82408, 4126
PRO82305, 3927	PRO82409, 4128
PRO82306, 3929	PRO82411, 4131
PRO82311, 3934	PRO82415, 4137
PRO82312, 3936	PRO82417, 4140
PRO82314, 3939	PRO82418, 4144
PRO82315, 3941	PRO82419, 4146
PRO82316, 3943	PRO82421, 4149
PRO82317, 3945	PRO82422, 4151
PRO82318, 3947	PRO82423, 4153
PRO82321, 3954	PRO82424, 4155
PRO82322, 3956	PRO82425, 4158
PRO82325, 3961	PRO82428, 4164
PRO82326, 3965	PRO82429, 4166
PRO82329, 3970	PRO82431, 4169
PRO82330, 3972	PRO82432, 4173
PRO82331, 3974	PRO82433, 4177
PRO82333, 3979	PRO82434, 4181
PRO82334, 3982	PRO82435, 4185
PRO82338, 3989	PRO82437, 4188
PRO82342, 3998	PRO82438, 4190
PRO82343, 4000	PRO82439, 4192
PRO82344, 4002	PRO82440, 4194
PRO82345, 4004	PRO82441, 4196
PRO82347, 4007	PRO82442, 4198
PRO82348, 4009	PRO82444, 4201
PRO82349, 4011	PRO82446, 4206
PRO82350, 4013	PRO82448, 4212
PRO82351, 4015	PRO82450, 4217
PRO82352, 4017	PRO82453, 4223
PRO82355, 4021	PRO82454, 4227
PRO82356, 4023	PRO82455, 4229
PRO82357, 4026	PRO82456, 4231
PRO82358, 4028	PRO82457, 4233
PRO82359, 4030	PRO82458, 4235
PRO82364, 4036	PRO82460, 4238
PRO82365, 4038	PRO82461, 4240
PRO82367, 4041	PRO82465, 4247
PRO82369, 4047	PRO82466, 4249
PRO82370, 4051	PRO82469, 4253
PRO82371, 4053	PRO82470, 4255

PRO82472, 4258	PRO82560, 4452
PRO82473, 4264	PRO82562, 4455
PRO82475, 4271	PRO82563, 4457
PRO82477, 4276	PRO82564, 4459
PRO82479, 4280	PRO82567, 4464
PRO82482, 4284	PRO82568, 4466
PRO82485, 4288	PRO82570, 4469
PRO82487, 4291	PRO82571, 4471
PRO82489, 4294	PRO82572, 4473
PRO82491, 4297	PRO82573, 4475
PRO82492, 4299	PRO82576, 4481
PRO82493, 4303	PRO82579, 4486
PRO82495, 4308	PRO82582, 4492
PRO82499, 4313	PRO82583, 4494
PRO82501, 4316	PRO82584, 4496
PRO82502, 4318	PRO82585, 4499
PRO82505, 4324	PRO82586, 4501
PRO82508, 4328 ·	PRO82587, 4503
PRO82509, 4330	PRO82589, 4506
PRO82510, 4332	PRO82590, 4510
PRO82513, 4339	PRO82592, 4515
PRO82514, 4341	PRO82593, 4523
PRO82515, 4345	PRO82594, 4525
PRO82516, 4347	PRO82597, 4529
PRO82517, 4349	PRO82598, 4533
PRO82518, 4351	PRO82599, 4536
PRO82521, 4365	PRO82602, 4540
PRO82522, 4367	PRO82603, 4542
PRO82523, 4369	PRO82606, 4546
PRO82524, 4377	PRO82607, 4548
PRO82525, 4379	PRO82608, 4552
PRO82526, 4381	PRO82609, 4554
PRO82527, 4383	PRO82611, 4557
PRO82528, 4385	PRO82612, 4559
PRO82529, 4387	PRO82615, 4563
PRO82530, 4389	PRO82616, 4567
PRO82531, 4391	PRO82618, 4572
PRO82532, 4393	PRO82619, 4574
PRO82533, 4395	PRO82621, 4585
PRO82534, 4397	PRO82622, 4587
PRO82535, 4401	PRO82623, 4589
PRO82536, 4403	PRO82624, 4591
PRO82537, 4405	PRO82625, 4593
PRO82538, 4407	PRO82626, 4595
PRO82540, 4412	PRO82627, 4598
PRO82542, 4415	PRO82629, 4601
PRO82543, 4417	PRO82630, 4603
PRO82544, 4419	PRO82631, 4605
PRO82546, 4424	PRO82632, 4607
PRO82548, 4428	PRO82633, 4609
PRO82551, 4433	PRO82634, 4611
PRO82554, 4437	PRO82635, 4615
PRO82555, 4439	PRO82637, 4618
PRO82556, 4441	PRO82638, 4620
PRO82557, 4443	PRO82640, 4623
PRO82558, 4445	PRO82641, 4625

PRO82642, 4629
PRO82643, 4631
PRO82645, 4634
PRO82646, 4636
PRO82654, 4649
PRO82656, 4652
PRO82658, 4655
PRO82659, 4657
PRO82661, 4660
PRO82662, 4662
PRO82663, 4664
PRO82664, 4668
PRO82665, 4673
PRO82667, 4676
PRO82669, 4679
PRO82670, 4681
PRO82671, 4683
PRO82672, 4685
PRO82674, 4690
PRO82675, 4692
PRO82678, 4698
PRO82679, 4702
PRO82683, 4711
PRO82687, 4722
PRO82689, 4726
PRO82691, 4731
PRO82692, 4733
PRO82694, 4736
PRO82695, 4738
PRO82696, 4740
PRO82699, 4746
PRO82702, 4753
PRO82704, 4756
PRO82706, 4759
PRO82707, 4762
PRO82708, 4764
PRO82709, 4766
PRO82712, 4770
PRO82713, 4772
PRO82714, 4774
PRO82715, 4776
PRO82717, 4781
PRO82718, 4785
PRO82719, 4787
PRO82720, 4789
PRO82721, 4791
PRO82722, 4795
PRO82724, 4802
PRO82725, 4804
PRO82726, 4808
PRO82728, 4811
PRO82729, 4815
PRO82730, 4817
PRO82732, 4823
PRO82736, 4828
PRO82737, 4831

PRO82738, 4833
PRO82739, 4835
PRO82740, 4837
PRO82741, 4839
PRO82743, 4848
PRO82745, 4851
PRO82746, 4853
PRO82748, 4858
PRO82749, 4860
PRO82750, 4862
PRO82753, 4866
PRO82754, 4868
PRO82755, 4870
PRO82756, 4872
PRO82757, 4874
PRO82758, 4876
PRO82760, 4882
PRO82761, 4884
PRO82762, 4886
PRO82763, 4894
PRO82764, 4896
PRO82768, 4907
PRO82769, 4909
PRO82771, 4914
PRO82774, 4922
PRO82776, 4925
PRO82778, 4930
PRO82779, 4932
PRO82787, 4947
PRO82788, 4949
PRO82790, 4952
PRO82791, 4956
PRO82792, 4959
PRO82793, 4961
PRO82794, 4966
PRO82795, 4968
PRO82796, 4972
PRO82797, 4974
PRO82799, 4979
PRO82800, 4981
PRO82805, 4993
PRO82807, 4997
PRO82812, 5005
PRO82813, 5007
PRO82814, 5009
PRO82816, 5012
PRO82818, 5017
PRO82825, 5029
PRO82828, 5033
PRO82829, 5035
PRO82831, 5038
PRO82833, 5044
PRO82835, 5047
PRO82840, 5059
PRO82841, 5061
PRO82842, 5063

154

PRO82846, 5068
PRO82850, 5077
PRO82851, 5079
PRO82852, 5081
PRO82855, 5085
PRO82856, 5087
PRO82859, 5091
PRO82861, 5099
PRO82862, 5101
PRO82863, 5105
PRO82864, 5107
PRO82867, 5111
PRO82871, 5118
PRO82872, 5121
PRO82873, 5125
PRO82874, 5129
PRO82877, 5136
PRO82879, 5139
PRO82881, 5142
PRO82882, 5144
PRO82884, 5149
PRO82885, 5151
PRO82886, 5153
PRO82887, 5156
PRO82888, 5158
PRO82892, 5167
PRO82893, 5170
PRO82894, 5172
PRO82895, 5174
PRO82897, 5177
PRO82899, 5182
PRO82901, 5185
PRO82902, 5187
PRO82903, 5189
PRO82904, 5191
PRO82905, 5193
PRO82909, 5198
PRO82910, 5204
PRO82912, 5211
PRO82915, 5215
PRO82917, 5220
PRO82920, 5224
PRO82923, 5228
PRO82925, 5231
PRO82930, 5245
PRO82933, 5249
PRO82934, 5253
PRO82935, 5255
PRO82939, 5263
PRO82940, 5265
PRO82943, 5271
PRO82944, 5275
PRO82947, 5287
PRO82948, 5289
PRO82949, 5291
PRO82950, 5293

PRO82952, 5296
PRO82954, 5301
PRO82956, 5304
PRO82957, 5306
PRO82958, 5309
PRO82962, 5318
PRO82963, 5320
PRO82964, 5322
PRO82965, 5324
PRO82967, 5327
PRO82970, 5333
PRO82971, 5335
PRO82975, 5340
PRO82976, 5342
PRO82977, 5344
PRO82978, 5346
PRO82979, 5348
PRO82980, 5351
PRO82982, 5356
PRO82983, 5359
PRO82984, 5363
PRO82985, 5365
PRO82987, 5368
PRO82991, 5373
PRO82992, 5375
PRO82995, 5381
PRO82998, 5386
PRO82999, 5390
PRO83000, 5392
PRO83002, 5397
PRO83004, 5400
PRO83005, 5402
PRO83007, 5405
PRO83008, 5410
PRO83009, 5412
PRO83010, 5414
PRO83011, 5416
PRO83012, 5418
PRO83013, 5420
PRO83014, 5424
PRO83016, 5431
PRO83017, 5433
PRO83018, 5437
PRO83027, 5452
PRO83029, 5455
PRO83030, 5457
PRO83031, 5459
PRO83035, 5464
PRO83037, 5467
PRO83038, 5469
PRO83039, 5471
PRO83040, 5473
PRO83041, 5475
PRO83042, 5481
PRO83050, 5493
PRO83052, 5500

PRO83054, 5509   PRO83141, 5714
PRO83056, 5520   PRO83142, 5716
PRO83059, 5526   PRO83143, 5718
PRO83065, 5533   PRO83144, 5720
PRO83066, 5535   PRO83145, 5724
PRO83068, 5538   PRO83146, 5726
PRO83069, 5540   PRO83149, 5730
PRO83071, 5545   PRO83150, 5732
PRO83072, 5547   PRO83152, 5737
PRO83073, 5553   PRO83153, 5741
PRO83074, 5555   PRO83155, 5751
PRO83075, 5557   PRO83156, 5753
PRO83076, 5559   PRO83157, 5755
PRO83077, 5561   PRO83159, 5758
PRO83078, 5567   PRO83161, 5764
PRO83080, 5572   PRO83163, 5767
PRO83082, 5579   PRO83165, 5770
PRO83083, 5581   PRO83167, 5777
PRO83084, 5583   PRO83169, 5784
PRO83085, 5585   PRO83170, 5788
PRO83086, 5587   PRO83174, 5797
PRO83087, 5596   PRO83175, 5799
PRO83089, 5599   PRO83176, 5801
PRO83090, 5601   PRO83177, 5803
PRO83092, 5604   PRO83178, 5805
PRO83093, 5606   PRO83179, 5807
PRO83095, 5609   PRO83180, 5812
PRO83096, 5611   PRO83182, 5817
PRO83098, 5614   PRO83183, 5820
PRO83099, 5618   PRO83184, 5822
PRO83100, 5620   PRO83185, 5827
PRO83101, 5622   PRO83186, 5829
PRO83102, 5624   PRO83187, 5833
PRO83103, 5630   PRO83188, 5835
PRO83104, 5632   PRO83189, 5839
PRO83105, 5634   PRO83190, 5841
PRO83107, 5637   PRO83191, 5843
PRO83108, 5643   PRO83193, 5848
PRO83109, 5645   PRO83194, 5850
PRO83112, 5653   PRO83195, 5852
PRO83113, 5657   PRO83196, 5854
PRO83114, 5659   PRO83197, 5856
PRO83116, 5662   PRO83198, 5858
PRO83117, 5664   PRO83199, 5860
PRO83118, 5666   PRO83200, 5862
PRO83121, 5672   PRO83201, 5864
PRO83125, 5684   PRO83202, 5866
PRO83128, 5690   PRO83203, 5868
PRO83129, 5692   PRO83204, 5870
PRO83130, 5694   PRO83205, 5872
PRO83132, 5697   PRO83210, 5884
PRO83133, 5699   PRO83211, 5888
PRO83135, 5702   PRO83212, 5895
PRO83137, 5707   PRO83213, 5899
PRO83138, 5709   PRO83214, 5901
PRO83139, 5711   PRO83217, 5909

PRO83219, 5912
PRO83222, 5916
PRO83223, 5918
PRO83224, 5920
PRO83233, 5932
PRO83234, 5934
PRO83235, 5938
PRO83236, 5942
PRO83237, 5944
PRO83242, 5952
PRO83244, 5955
PRO83245, 5959
PRO83247, 5962
PRO83252, 5970
PRO83253, 5972
PRO83254, 5978
PRO83255, 5980
PRO83256, 5982
PRO83257, 5984
PRO83260, 5988
PRO83261, 5992
PRO83263, 5997
PRO83265, 6002
PRO83266, 6008
PRO83267, 6010
PRO83270, 6016
PRO83271, 6018
PRO83273, 6026
PRO83274, 6033
PRO83275, 6037
PRO83276, 6041
PRO83278, 6044
PRO83279, 6048
PRO83280, 6050
PRO83282, 6053
PRO83283, 6057
PRO83285, 6062
PRO83288, 6067
PRO83289, 6073
PRO83291, 6078
PRO83292, 6084
PRO83293, 6086
PRO83297, 6092
PRO83300, 6096
PRO83301, 6098
PRO83302, 6100
PRO83304, 6107
PRO83306, 6110
PRO83307, 6112
PRO83309, 6115
PRO83310, 6117
PRO83312, 6120
PRO83316, 6129
PRO83319, 6133
PRO83320, 6135
PRO83321, 6137

PRO83323, 6144
PRO83328, 6156
PRO83331, 6162
PRO83332, 6164
PRO83333, 6166
PRO83334, 6168
PRO83335, 6171
PRO83337, 6175
PRO83339, 6178
PRO83340, 6180
PRO83341, 6184
PRO83343, 6193
PRO83344, 6195
PRO83345, 6200
PRO83346, 6202
PRO83349, 6208
PRO83351, 6211
PRO83352, 6213
PRO83353, 6219
PRO83354, 6221
PRO83355, 6223
PRO83360, 6234
PRO83361, 6236
PRO83365, 6247
PRO83366, 6249
PRO83368, 6252
PRO83369, 6254
PRO83372, 6260
PRO83373, 6262
PRO83374, 6264
PRO83375, 6266
PRO83381, 6277
PRO83383, 6283
PRO83385, 6290
PRO83386, 6292
PRO83387, 6294
PRO83388, 6296
PRO83389, 6298
PRO83391, 6301
PRO83392, 6303
PRO83393, 6305
PRO83394, 6307
PRO83395, 6309
PRO83397, 6314
PRO83400, 6324
PRO83403, 6331
PRO83404, 6337
PRO83405, 6347
PRO868, 1871
PRO9112, 3668
PRO9785, 1369
PRO9819, 2676
PRO983, 5825
PRO9886, 706
PRO9902, 2952
PRO9980, 2479

PRO83054, 5509
PRO83056, 5520
PRO83059, 5526
PRO83065, 5533
PRO83066, 5535
PRO83068, 5538
PRO83069, 5540
PRO83071, 5545
PRO83072, 5547
PRO83073, 5553
PRO83074, 5555
PRO83075, 5557
PRO83076, 5559
PRO83077, 5561
PRO83078, 5567
PRO83080, 5572
PRO83082, 5579
PRO83083, 5581
PRO83084, 5583
PRO83085, 5585
PRO83086, 5587
PRO83087, 5596
PRO83089, 5599
PRO83090, 5601
PRO83092, 5604
PRO83093, 5606
PRO83095, 5609
PRO83096, 5611
PRO83098, 5614
PRO83099, 5618
PRO83100, 5620
PRO83101, 5622
PRO83102, 5624
PRO83103, 5630
PRO83104, 5632
PRO83105, 5634
PRO83107, 5637
PRO83108, 5643
PRO83109, 5645
PRO83112, 5653
PRO83113, 5657
PRO83114, 5659
PRO83116, 5662
PRO83117, 5664
PRO83118, 5666
PRO83121, 5672
PRO83125, 5684
PRO83128, 5690
PRO83129, 5692
PRO83130, 5694
PRO83132, 5697
PRO83133, 5699
PRO83135, 5702
PRO83137, 5707
PRO83138, 5709
PRO83139, 5711

PRO83141, 5714
PRO83142, 5716
PRO83143, 5718
PRO83144, 5720
PRO83145, 5724
PRO83146, 5726
PRO83149, 5730
PRO83150, 5732
PRO83152, 5737
PRO83153, 5741
PRO83155, 5751
PRO83156, 5753
PRO83157, 5755
PRO83159, 5758
PRO83161, 5764
PRO83163, 5767
PRO83165, 5770
PRO83167, 5777
PRO83169, 5784
PRO83170, 5788
PRO83174, 5797
PRO83175, 5799
PRO83176, 5801
PRO83177, 5803
PRO83178, 5805
PRO83179, 5807
PRO83180, 5812
PRO83182, 5817
PRO83183, 5820
PRO83184, 5822
PRO83185, 5827
PRO83186, 5829
PRO83187, 5833
PRO83188, 5835
PRO83189, 5839
PRO83190, 5841
PRO83191, 5843
PRO83193, 5848
PRO83194, 5850
PRO83195, 5852
PRO83196, 5854
PRO83197, 5856
PRO83198, 5858
PRO83199, 5860
PRO83200, 5862
PRO83201, 5864
PRO83202, 5866
PRO83203, 5868
PRO83204, 5870
PRO83205, 5872
PRO83210, 5884
PRO83211, 5888
PRO83212, 5895
PRO83213, 5899
PRO83214, 5901
PRO83217, 5909

PRO83219, 5912   PRO83323, 6144
PRO83222, 5916   PRO83328, 6156
PRO83223, 5918   PRO83331, 6162
PRO83224, 5920   PRO83332, 6164
PRO83233, 5932   PRO83333, 6166
PRO83234, 5934   PRO83334, 6168
PRO83235, 5938   PRO83335, 6171
PRO83236, 5942   PRO83337, 6175
PRO83237, 5944   PRO83339, 6178
PRO83242, 5952   PRO83340, 6180
PRO83244, 5955   PRO83341, 6184
PRO83245, 5959   PRO83343, 6193
PRO83247, 5962   PRO83344, 6195
PRO83252, 5970   PRO83345, 6200
PRO83253, 5972   PRO83346, 6202
PRO83254, 5978   PRO83349, 6208
PRO83255, 5980   PRO83351, 6211
PRO83256, 5982   PRO83352, 6213
PRO83257, 5984   PRO83353, 6219
PRO83260, 5988   PRO83354, 6221
PRO83261, 5992   PRO83355, 6223
PRO83263, 5997   PRO83360, 6234
PRO83265, 6002   PRO83361, 6236
PRO83266, 6008   PRO83365, 6247
PRO83267, 6010   PRO83366, 6249
PRO83270, 6016   PRO83368, 6252
PRO83271, 6018   PRO83369, 6254
PRO83273, 6026   PRO83372, 6260
PRO83274, 6033   PRO83373, 6262
PRO83275, 6037   PRO83374, 6264
PRO83276, 6041   PRO83375, 6266
PRO83278, 6044   PRO83381, 6277
PRO83279, 6048   PRO83383, 6283
PRO83280, 6050   PRO83385, 6290
PRO83282, 6053   PRO83386, 6292
PRO83283, 6057   PRO83387, 6294
PRO83285, 6062   PRO83388, 6296
PRO83288, 6067   PRO83389, 6298
PRO83289, 6073   PRO83391, 6301
PRO83291, 6078   PRO83392, 6303
PRO83292, 6084   PRO83393, 6305
PRO83293, 6086   PRO83394, 6307
PRO83297, 6092   PRO83395, 6309
PRO83300, 6096   PRO83397, 6314
PRO83301, 6098   PRO83400, 6324
PRO83302, 6100   PRO83403, 6331
PRO83304, 6107   PRO83404, 6337
PRO83306, 6110   PRO83405, 6347
PRO83307, 6112   PRO868, 1871
PRO83309, 6115   PRO9112, 3668
PRO83310, 6117   PRO9785, 1369
PRO83312, 6120   PRO9819, 2676
PRO83316, 6129   PRO983, 5825
PRO83319, 6133   PRO9886, 706
PRO83320, 6135   PRO9902, 2952
PRO83321, 6137   PRO9980, 2479

PRO9984, 969
PRO9987, 3753

Accession Index (to Figure number)

NM_000979, 5571
NM_000980, 5334
NM_000981, 4798
NM_000982, 3091
NM_000983, 34
NM_000985, 5067
NM_000986, 1206
NM_000987, 4714
NM_000989, 2588
NM_000990, 3155
NM_000991, 5613
NM_000992, 1170
NM_000993, 832
NM_000994, 1064
NM_000997, 1570
NM_000998, 966
NM_001000, 6278
NM_001002, 3827
NM_001003, 4228
NM_001005, 3331
NM_001006, 1506
NM_001007, 6224
NM_001009, 5633
NM_001010, 2651
NM_001011, 643
NM_001012, 210
NM_001016, 2111
NM_001017, 3171
NM_001018, 5126
NM_001020, 5426
NM_001021, 4283
NM_001022, 5468
NM_001023, 2552
NM_001024, 5847
NM_001025, 1632
NM_001026, 2980
NM_001028, 3361
NM_001029, 3656
NM_001030, 440
NM_001034, 651
NM_001038, 3478
NM_001043, 4487
NM_001050, 4841
NM_001064, 1159
NM_001065, 3480
NM_001068, 1079
NM_001069, 2050
NM_001084, 2369
NM_001087, 994
NM_001098, 6079
NM_001101, 2174
NM_001102, 4040
NM_001122, 2649
NM_001134, 1446
NM_001154, 1489
NM_001157, 2990

NM_001168, 4985
NM_001190, 5568
NM_001199, 2495
NM_001207, 1624
NM_001211, 4139
NM_001218, 4203
NM_001235, 3333
NM_001238, 5374
NM_001247, 5703
NM_001255, 194
NM_001262, 229
NM_001273, 3468
NM_001274, 3411
NM_001275, 4065
NM_001283, 2365
NM_001287, 4372
NM_001288, 1969
NM_001293, 3337
NM_001294, 5508
NM_001313, 1396
NM_001319, 5141
NM_001320, 1971
NM_001324, 5814
NM_001325, 6239
NM_001333, 2736
NM_001344, 3984
NM_001350, 1942
NM_001363, 6318
NM_001407, 1132
NM_001415, 6143
NM_001416, 4687
NM_001418, 3163
NM_001428, 31
NM_001436, 5436
NM_001444, 2575
NM_001450, 836
NM_001463, 916
NM_001465, 1573
NM_001467, 3359
NM_001469, 6081
NM_001494, 2891
NM_001500, 2052
NM_001517, 1997
NM_001521, 689
NM_001530, 4016
NM_001536, 5539
NM_001539, 2660
NM_001540, 2308
NM_001553, 1435
NM_001554, 269
NM_001560, 6270
NM_001567, 3322
NM_001568, 2596
NM_001569, 6332
NM_001571, 5542
NM_001605, 4564

NM_001607, 1097
NM_001610, 3206
NM_001613, 3008
NM_001622, 1330
NM_001628, 2423
NM_001641, 3997
NM_001644, 3511
NM_001647, 1352
NM_001648, 5590
NM_001659, 3550
NM_001662, 2398
NM_001667, 3284
NM_001673, 2355
NM_001687, 5115
NM_001688, 308
NM_001696, 5941
NM_001697, 5892
NM_001710, 1959
NM_001734, 3452
NM_001743, 5494
NM_001747, 806
NM_001751, 3137
NM_001753, 2391
NM_001757, 5894
NM_001760, 1898
NM_001762, 2274
NM_001780, 3663
NM_001791, 81
NM_001816, 5478
NM_001819, 5679
NM_001827, 2714
NM_001831, 2506
NM_001833, 2689
NM_001842, 2668
NM_001853, 5853
NM_001861, 4614
NM_001862, 827
NM_001878, 392
NM_001907, 4579
NM_001909, 3133
NM_001920, 3740
NM_001930, 5267
NM_001935, 894
NM_001944, 5050
NM_001959, 950
NM_001961, 5178
NM_001964, 1689
NM_001969, 4098
NM_001970, 4697
NM_001975, 3458
NM_001983, 5502
NM_001985, 5593
NM_002003, 2834
NM_002004, 422
NM_002011, 1836
NM_002014, 3439

NM_002015, 3896
NM_002018, 4719
NM_002028, 4010
NM_002046, 3473
NM_002047, 2265
NM_002075, 3463
NM_002079, 3066
NM_002083, 4012
NM_002084, 1704
NM_002085, 5112
NM_002086, 4953
NM_002087, 4845
NM_002106, 1478
NM_002109, 1779
NM_002128, 3887
NM_002129, 1522
NM_002130, 1582
NM_002133, 6020
NM_002137, 2210
NM_002157, 930
NM_002161, 2716
NM_002168, 4293
NM_002178, 3600
NM_002211, 2919
NM_002212, 5742
NM_002229, 5272
NM_002265, 4834
NM_002273, 3591
NM_002274, 4814
NM_002275, 4812
NM_002276, 4810
NM_002295, 1108
NM_002305, 6038
NM_002306, 4022
NM_002339, 3115
NM_002340, 5931
NM_002342, 3476
NM_002345, 3752
NM_002355, 3489
NM_002358, 1485
NM_002364, 6147
NM_002385, 5086
NM_002386, 4626
NM_002388, 1866
NM_002396, 5069
NM_002397, 1646
NM_002401, 4933
NM_002411, 3245
NM_002413, 1494
NM_002414, 6124
NM_002415, 5979
NM_002453, 751
NM_002466, 5774
NM_002468, 1095
NM_002473, 6025
NM_002477, 1368

NM_002484, 4416	NM_002923, 540
NM_002486, 2734	NM_002934, 3992
NM_002489, 2193	NM_002938, 1386
NM_002492, 1297	NM_002946, 127
NM_002512, 4887	NM_002947, 2188
NM_002520, 1803	NM_002948, 1076
NM_002537, 4210	NM_002952, 4382
NM_002539, 659	NM_002954, 749
NM_002567, 3816	NM_002961, 369
NM_002568, 2593	NM_002965, 364
NM_002574, 220	NM_002979, 235
NM_002588, 1728	NM_003002, 3390
NM_002606, 5900	NM_003021, 5161
NM_002615, 4647	NM_003025, 5188
NM_002617, 12	NM_003055, 2947
NM_002632, 4052	NM_003064, 5781
NM_002634, 4939	NM_003072, 5254
NM_002638, 5779	NM_003076, 3568
NM_002654, 4242	NM_003088, 2176
NM_002660, 5771	NM_003090, 4320
NM_002668, 6185	NM_003091, 5654
NM_002689, 3289	NM_003092, 5683
NM_002691, 5580	NM_003104, 4187
NM_002707, 681	NM_003107, 2032
NM_002712, 1030	NM_003123, 4511
NM_002720, 4518	NM_003124, 789
NM_002727, 2961	NM_003128, 746
NM_002730, 5298	NM_003132, 50
NM_002733, 3555	NM_003137, 1916
NM_002766, 4975	NM_003143, 2435
NM_002787, 2254	NM_003145, 409
NM_002789, 4261	NM_003146, 3215
NM_002792, 5838	NM_003149, 1099
NM_002793, 2137	NM_003169, 5428
NM_002796, 346	NM_003181, 2135
NM_002802, 4059	NM_003216, 6077
NM_002803, 2378	NM_003283, 5608
NM_002809, 4805	NM_003287, 2104
NM_002810, 348	NM_003289, 2680
NM_002812, 5401	NM_003290, 5312
NM_002813, 3837	NM_003295, 3900
NM_002815, 4778	NM_003310, 649
NM_002819, 5102	NM_003316, 5896
NM_002827, 5809	NM_003334, 6167
NM_002846, 980	NM_003349, 5804
NM_002854, 1188	NM_003350, 2546
NM_002856, 5515	NM_003365, 1134
NM_002857, 481	NM_003366, 4421
NM_002863, 4029	NM_003370, 5499
NM_002870, 438	NM_003374, 1677
NM_002878, 4784	NM_003375, 2982
NM_002883, 6075	NM_003378, 2367
NM_002887, 1800	NM_003389, 2728
NM_002913, 1427	NM_003400, 761
NM_002915, 3891	NM_003401, 1636
NM_002921, 3002	NM_003406, 2590

NM_003418, 1250	NM_004053, 1900
NM_003453, 3864	NM_004060, 1791
NM_003461, 2440	NM_004074, 3264
NM_003472, 2034	NM_004084, 2476
NM_003516, 459	NM_004085, 6242
NM_003564, 474	NM_004092, 3099
NM_003598, 5556	NM_004111, 3253
NM_003617, 497	NM_004117, 1918
NM_003624, 5214	NM_004127, 5008
NM_003626, 3316	NM_004134, 1693
NM_003646, 3197	NM_004135, 6340
NM_003662, 6149	NM_004147, 6011
NM_003680, 157	NM_004152, 5154
NM_003681, 5905	NM_004159, 1952
NM_003685, 5203	NM_004175, 5983
NM_003687, 1673	NM_004176, 4742
NM_003689, 71	NM_004178, 3614
NM_003712, 5093	NM_004181, 1430
NM_003714, 1812	NM_004182, 6174
NM_003720, 5898	NM_004193, 3045
NM_003721, 5360	NM_004203, 4402
NM_003722, 1335	NM_004208, 6285
NM_003729, 288	NM_004217, 4699
NM_003735, 1730	NM_004219, 1795
NM_003736, 1732	NM_004240, 5206
NM_003739, 2883	NM_004247, 4879
NM_003752, 4449	NM_004261, 273
NM_003753, 6027	NM_004265, 3249
NM_003755, 5234	NM_004309, 5002
NM_003756, 2598	NM_004322, 3256
NM_003757, 148	NM_004323, 2662
NM_003765, 5288	NM_004324, 5564
NM_003766, 4865	NM_004335, 5328
NM_003779, 468	NM_004339, 5921
NM_003780, 199	NM_004341, 692
NM_003787, 5052	NM_004345, 1128
NM_003815, 457	NM_004360, 4549
NM_003824, 3313	NM_004398, 3392
NM_003836, 4088	NM_004401, 48
NM_003837, 2723	NM_004404, 1034
NM_003859, 5811	NM_004435, 2761
NM_003876, 4708	NM_004448, 4796
NM_003877, 3757	NM_004461, 5279
NM_003906, 5933	NM_004483, 4602
NM_003908, 5734	NM_004493, 6190
NM_003915, 5747	NM_004509, 1012
NM_003932, 6070	NM_004510, 1014
NM_003937, 881	NM_004524, 4960
NM_003938, 5148	NM_004539, 5072
NM_003971, 4891	NM_004547, 1218
NM_003973, 1110	NM_004550, 470
NM_003979, 3498	NM_004551, 3199
NM_004000, 306	NM_004555, 4586
NM_004004, 3866	NM_004573, 4141
NM_004044, 955	NM_004595, 6140
NM_004048, 4178	NM_004596, 5448

NM_004599, 6085
NM_004618, 4716
NM_004632, 414
NM_004635, 1155
NM_004636, 1149
NM_004637, 1246
NM_004638, 1979
NM_004639, 1973
NM_004640, 1986
NM_004673, 529
NM_004691, 4545
NM_004697, 2751
NM_004699, 6323
NM_004701, 4197
NM_004704, 1182
NM_004706, 5470
NM_004714, 5434
NM_004725, 3093
NM_004728, 2959
NM_004735, 1026
NM_004738, 5824
NM_004739, 3230
NM_004766, 1270
NM_004767, 576
NM_004772, 1650
NM_004781, 44
NM_004794, 6287
NM_004813, 3190
NM_004821, 1787
NM_004844, 1066
NM_004846, 998
NM_004859, 4921
NM_004870, 4689
NM_004889, 2342
NM_004893, 1685
NM_004905, 511
NM_004911, 2442
NM_004928, 5915
NM_004930, 69
NM_004933, 4638
NM_004939, 662
NM_004957, 2775
NM_004960, 4465
NM_004964, 150
NM_004973, 2039
NM_004982, 3526
NM_004990, 3669
NM_004992, 6330
NM_004994, 5791
NM_004995, 3976
NM_005000, 2396
NM_005002, 3448
NM_005003, 4446
NM_005004, 3063
NM_005005, 2606
NM_005008, 6083

NM_005015, 3981
NM_005016, 3620
NM_005022, 4665
NM_005030, 4442
NM_005036, 6104
NM_005042, 3524
NM_005053, 5283
NM_005072, 4581
NM_005080, 5987
NM_005109, 1093
NM_005110, 1854
NM_005112, 1421
NM_005115, 4500
NM_005132, 3962
NM_005141, 1508
NM_005163, 4110
NM_005171, 3574
NM_005174, 2895
NM_005194, 5808
NM_005217, 2478
NM_005220, 4946
NM_005224, 5104
NM_005243, 5989
NM_005269, 3667
NM_005271, 3004
NM_005291, 854
NM_005300, 6159
NM_005313, 4174
NM_005324, 4969
NM_005330, 3146
NM_005333, 6126
NM_005345, 1963
NM_005346, 1961
NM_005347, 2790
NM_005348, 4092
NM_005362, 6316
NM_005364, 6308
NM_005370, 5314
NM_005371, 3689
NM_005378, 657
NM_005389, 2126
NM_005432, 4101
NM_005439, 3466
NM_005440, 4877
NM_005452, 1944
NM_005474, 4850
NM_005490, 5208
NM_005498, 5241
NM_005514, 2155
NM_005517, 110
NM_005520, 1850
NM_005548, 4568
NM_005563, 105
NM_005566, 3175
NM_005572, 404
NM_005573, 1718

NM_005581, 5517
NM_005594, 3628
NM_005614, 2460
NM_005617, 1708
NM_005620, 340
NM_005623, 4782
NM_005632, 4362
NM_005657, 4170
NM_005663, 1382
NM_005676, 6165
NM_005686, 550
NM_005692, 2458
NM_005693, 3204
NM_005698, 424
NM_005710, 6181
NM_005713, 1602
NM_005717, 517
NM_005718, 1055
NM_005720, 2348
NM_005724, 4273
NM_005726, 3695
NM_005729, 2986
NM_005731, 996
NM_005745, 6344
NM_005754, 1697
NM_005762, 5627
NM_005770, 4176
NM_005775, 2491
NM_005783, 829
NM_005787, 1316
NM_005796, 4575
NM_005806, 5887
NM_005826, 83
NM_005830, 3898
NM_005831, 4911
NM_005833, 2792
NM_005837, 2326
NM_005850, 461
NM_005851, 3301
NM_005855, 1024
NM_005866, 2670
NM_005877, 5999
NM_005884, 5421
NM_005889, 3509
NM_005911, 808
NM_005915, 864
NM_005917, 764
NM_005918, 2306
NM_005973, 389
NM_005981, 3681
NM_005983, 1579
NM_005985, 5802
NM_005997, 350
NM_006000, 982
NM_006012, 5201
NM_006013, 6326

NM_006019, 3304
NM_006023, 2899
NM_006039, 4936
NM_006053, 3306
NM_006058, 1702
NM_006066, 218
NM_006067, 4612
NM_006098, 1852
NM_006101, 5023
NM_006109, 3973
NM_006110, 4423
NM_006112, 159
NM_006114, 5513
NM_006115, 5975
NM_006128, 2497
NM_006131, 2499
NM_006132, 2501
NM_006136, 2393
NM_006169, 3380
NM_006184, 5566
NM_006227, 5789
NM_006230, 2246
NM_006245, 1892
NM_006247, 5497
NM_006250, 3522
NM_006253, 3831
NM_006262, 3546
NM_006265, 2600
NM_006271, 374
NM_006272, 5935
NM_006280, 6338
NM_006289, 2682
NM_006295, 1967
NM_006303, 2178
NM_006330, 2550
NM_006335, 571
NM_006339, 5171
NM_006342, 1374
NM_006349, 2371
NM_006354, 1049
NM_006362, 3242
NM_006365, 396
NM_006373, 4875
NM_006384, 4305
NM_006387, 5319
NM_006395, 1062
NM_006397, 5277
NM_006401, 2732
NM_006427, 4106
NM_006428, 4360
NM_006429, 792
NM_006430, 759
NM_006432, 4048
NM_006435, 3113
NM_006439, 1504
NM_006440, 5954

NM_006453, 4384
NM_006455, 4822
NM_006470, 4725
NM_006478, 5991
NM_006488, 703
NM_006494, 5476
NM_006503, 5441
NM_006513, 298
NM_006516, 188
NM_006523, 3055
NM_006530, 3727
NM_006556, 452
NM_006559, 146
NM_006576, 3697
NM_006585, 5885
NM_006586, 1894
NM_006589, 428
NM_006600, 118
NM_006601, 3636
NM_006621, 300
NM_006625, 93
NM_006636, 794
NM_006646, 3881
NM_006659, 3101
NM_006666, 5558
NM_006667, 6272
NM_006670, 2070
NM_006693, 2344
NM_006694, 436
NM_006698, 5760
NM_006708, 1904
NM_006711, 4392
NM_006746, 6134
NM_006761, 4642
NM_006763, 548
NM_006764, 1151
NM_006769, 271
NM_006787, 6197
NM_006791, 4279
NM_006799, 4408
NM_006801, 5576
NM_006805, 1687
NM_006808, 2740
NM_006810, 1223
NM_006812, 3678
NM_006815, 3847
NM_006816, 1830
NM_006817, 3785
NM_006821, 4046
NM_006824, 192
NM_006825, 3807
NM_006826, 655
NM_006833, 2338
NM_006835, 1449
NM_006837, 2565
NM_006839, 814

NM_006842, 3295
NM_006844, 5308
NM_006854, 2184
NM_006862, 344
NM_006888, 4063
NM_006899, 5661
NM_006908, 2182
NM_006924, 4908
NM_006928, 3660
NM_006932, 6007
NM_006938, 5039
NM_006941, 6049
NM_006942, 4691
NM_006990, 124
NM_007002, 5844
NM_007019, 5785
NM_007032, 6040
NM_007034, 267
NM_007046, 705
NM_007047, 2029
NM_007062, 3805
NM_007065, 5237
NM_007074, 4516
NM_007085, 1216
NM_007096, 2691
NM_007100, 1366
NM_007103, 3299
NM_007104, 1922
NM_007158, 302
NM_007165, 5152
NM_007173, 3348
NM_007178, 3501
NM_007184, 1165
NM_007186, 5744
NM_007190, 3089
NM_007209, 2794
NM_007242, 4566
NM_007244, 3520
NM_007260, 89
NM_007262, 42
NM_007263, 5352
NM_007268, 6204
NM_007273, 3455
NM_007275, 1153
NM_007276, 2214
NM_007279, 5619
NM_007310, 5958
NM_007311, 6095
NM_007317, 4507
NM_007355, 1874
NM_007364, 4277
NM_007372, 4931
NM_012068, 5525
NM_012098, 2782
NM_012099, 5504
NM_012100, 977

NM_012101, 3420
NM_012111, 4055
NM_012112, 5715
NM_012116, 5519
NM_012138, 4838
NM_012170, 4265
NM_012179, 6017
NM_012181, 5350
NM_012203, 2693
NM_012207, 2955
NM_012237, 5409
NM_012248, 4451
NM_012255, 5698
NM_012264, 6054
NM_012286, 6246
NM_012296, 3344
NM_012323, 6052
NM_012391, 1929
NM_012412, 2236
NM_012423, 5550
NM_012437, 381
NM_012458, 5155
NM_012469, 5873
NM_012486, 596
NM_013237, 1834
NM_013247, 801
NM_013265, 3279
NM_013274, 3037
NM_013277, 3566
NM_013296, 292
NM_013333, 5617
NM_013336, 1238
NM_013341, 903
NM_013363, 1276
NM_013365, 6032
NM_013369, 5911
NM_013375, 2027
NM_013393, 2165
NM_013402, 3251
NM_013403, 5492
NM_013406, 5269
NM_013407, 5270
NM_013417, 2718
NM_013442, 2675
NM_013451, 3013
NM_014003, 4592
NM_014008, 6187
NM_014033, 3576
NM_014035, 1664
NM_014042, 3320
NM_014062, 4556
NM_014063, 2251
NM_014107, 2077
NM_014138, 6163
NM_014166, 3906
NM_014172, 2862

NM_014173, 5326
NM_014176, 578
NM_014184, 585
NM_014188, 17
NM_014189, 1390
NM_014190, 1388
NM_014203, 5536
NM_014214, 5032
NM_014226, 4095
NM_014236, 626
NM_014248, 6072
NM_014255, 3631
NM_014267, 3173
NM_014275, 1846
NM_014285, 2820
NM_014294, 2567
NM_014303, 6003
NM_014306, 6015
NM_014311, 3606
NM_014320, 2116
NM_014321, 4476
NM_014325, 3777
NM_014335, 4182
NM_014341, 1906
NM_014353, 4386
NM_014408, 167
NM_014413, 2180
NM_014426, 5685
NM_014444, 4168
NM_014445, 1284
NM_014452, 1870
NM_014453, 5625
NM_014481, 6199
NM_014501, 5615
NM_014502, 3220
NM_014515, 3724
NM_014556, 1394
NM_014571, 142
NM_014585, 923
NM_014587, 4370
NM_014610, 3232
NM_014624, 367
NM_014649, 5199
NM_014663, 202
NM_014670, 934
NM_014685, 4530
NM_014713, 667
NM_014736, 4214
NM_014737, 5676
NM_014742, 5721
NM_014747, 180
NM_014748, 684
NM_014752, 3329
NM_014773, 1721
NM_014776, 3792
NM_014778, 3878

NM_014800, 2259	NM_016085, 694
NM_014814, 1195	NM_016091, 6045
NM_014829, 1681	NM_016095, 4610
NM_014837, 519	NM_016111, 4374
NM_014847, 446	NM_016119, 3912
NM_014849, 463	NM_016143, 5652
NM_014851, 36	NM_016169, 3051
NM_014868, 3823	NM_016174, 2767
NM_014887, 3889	NM_016176, 26
NM_014919, 1378	NM_016183, 73
NM_014931, 5610	NM_016202, 5621
NM_014933, 1457	NM_016223, 3210
NM_014941, 6005	NM_016249, 6300
NM_014972, 4628	NM_016263, 5169
NM_015043, 1843	NM_016267, 6293
NM_015062, 3042	NM_016286, 5006
NM_015064, 3430	NM_016292, 4414
NM_015068, 2319	NM_016304, 4193
NM_015129, 6276	NM_016328, 2293
NM_015140, 6097	NM_016357, 3572
NM_015179, 3024	NM_016359, 4152
NM_015322, 4226	NM_016361, 328
NM_015324, 3149	NM_016410, 2664
NM_015373, 6056	NM_016440, 5523
NM_015388, 1886	NM_016445, 4035
NM_015438, 3470	NM_016456, 564
NM_015449, 444	NM_016498, 6001
NM_015453, 1043	NM_016526, 3107
NM_015472, 1282	NM_016539, 5181
NM_015484, 99	NM_016558, 5750
NM_015511, 5752	NM_016567, 3097
NM_015533, 3225	NM_016579, 5216
NM_015544, 4780	NM_016587, 2216
NM_015584, 4761	NM_016592, 5826
NM_015629, 5600	NM_016638, 3843
NM_015636, 686	NM_016639, 4398
NM_015640, 260	NM_016641, 4335
NM_015644, 1057	NM_016645, 4302
NM_015646, 3720	NM_016647, 2614
NM_015665, 3604	NM_016732, 5733
NM_015702, 885	NM_016838, 887
NM_015714, 555	NM_016839, 889
NM_015853, 3238	NM_016930, 1400
NM_015920, 4205	NM_016940, 5883
NM_015932, 3884	NM_016941, 5432
NM_015934, 941	NM_017443, 2753
NM_015937, 5783	NM_017458, 4498
NM_015953, 5546	NM_017491, 1419
NM_015965, 5362	NM_017546, 834
NM_015966, 5745	NM_017566, 4617
NM_016003, 2172	NM_017572, 5146
NM_016016, 4847	NM_017595, 4871
NM_016022, 334	NM_017601, 1902
NM_016026, 4037	NM_017610, 4195
NM_016030, 647	NM_017613, 5890
NM_016059, 1908	NM_017647, 4929

NM_017668, 4327
NM_017670, 3266
NM_017684, 4208
NM_017722, 5286
NM_017751, 859
NM_017760, 2467
NM_017761, 91
NM_017768, 262
NM_017777, 4906
NM_017789, 825
NM_017797, 5143
NM_017801, 1081
NM_017803, 4584
NM_017807, 4003
NM_017815, 3971
NM_017822, 3552
NM_017825, 165
NM_017827, 5413
NM_017829, 5939
NM_017847, 513
NM_017853, 4594
NM_017868, 3386
NM_017874, 5668
NM_017876, 5098
NM_017882, 4224
NM_017883, 6179
NM_017891, 8
NM_017895, 5798
NM_017900, 22
NM_017901, 3810
NM_017910, 674
NM_017916, 5554
NM_017952, 812
NM_017955, 4112
NM_017974, 1020
NM_018019, 4737
NM_018023, 1306
NM_018032, 4358
NM_018034, 1575
NM_018035, 5458
NM_018047, 1706
NM_018048, 3517
NM_018054, 4436
NM_018066, 116
NM_018070, 239
NM_018085, 569
NM_018096, 4792
NM_018110, 4535
NM_018113, 3548
NM_018116, 420
NM_018122, 535
NM_018124, 4588
NM_018135, 1880
NM_018154, 5300
NM_018174, 5332
NM_018188, 10

NM_018209, 5861
NM_018212, 587
NM_018217, 5740
NM_018238, 2437
NM_018242, 4747
NM_018250, 2510
NM_018253, 418
NM_018255, 5056
NM_018270, 5849
NM_018310, 2527
NM_018346, 4898
NM_018357, 4232
NM_018410, 1018
NM_018454, 4154
NM_018457, 3610
NM_018463, 3442
NM_018464, 2951
NM_018468, 5387
NM_018486, 6222
NM_018509, 4900
NM_018607, 721
NM_018660, 2512
NM_018668, 4312
NM_018674, 973
NM_018686, 3513
NM_018912, 1734
NM_018913, 1736
NM_018914, 1738
NM_018915, 1740
NM_018916, 1742
NM_018917, 1744
NM_018918, 1746
NM_018919, 1748
NM_018920, 1750
NM_018921, 1752
NM_018922, 1754
NM_018923, 1756
NM_018924, 1758
NM_018925, 1760
NM_018926, 1762
NM_018927, 1764
NM_018928, 1766
NM_018929, 1768
NM_018947, 2208
NM_018948, 41
NM_018950, 2017
NM_018955, 4728
NM_018957, 6034
NM_018977, 6214
NM_019013, 4682
NM_019058, 2971
NM_019059, 2206
NM_019082, 2242
NM_019095, 5681
NM_019099, 310
NM_019554, 371

NM_019606, 2333
NM_019609, 5663
NM_019619, 2916
NM_019848, 6321
NM_019852, 3988
NM_019887, 3839
NM_020037, 4895
NM_020038, 4893
NM_020132, 5908
NM_020134, 709
NM_020149, 4136
NM_020158, 5454
NM_020188, 4604
NM_020230, 5232
NM_020243, 6058
NM_020299, 2425
NM_020315, 6036
NM_020320, 2075
NM_020347, 1113
NM_020401, 3717
NM_020414, 4069
NM_020418, 1180
NM_020548, 871
NM_020675, 896
NM_020677, 4340
NM_020701, 1248
NM_020990, 4172
NM_020992, 3017
NM_021019, 3646
NM_021029, 6244
NM_021079, 4883
NM_021095, 698
NM_021103, 803
NM_021104, 3654
NM_021107, 5415
NM_021121, 948
NM_021126, 6029
NM_021129, 2964
NM_021130, 2238
NM_021141, 958
NM_021154, 2701
NM_021158, 5638
NM_021177, 1965
NM_021178, 4006
NM_021195, 4400
NM_021213, 4919
NM_021219, 5879
NM_021226, 2945
NM_021626, 4917
NM_021709, 4108
NM_021728, 4020
NM_021826, 5665
NM_021830, 3033
NM_021831, 707
NM_021870, 1517
NM_021871, 1513

NM_021932, 3109
NM_021934, 3588
NM_021948, 394
NM_021953, 3444
NM_021966, 4079
NM_021999, 3908
NM_022003, 3369
NM_022039, 3039
NM_022044, 5973
NM_022048, 4216
NM_022105, 5857
NM_022137, 4042
NM_022141, 6101
NM_022158, 5016
NM_022170, 2288
NM_022171, 1145
NM_022362, 3029
NM_022369, 4246
NM_022371, 527
NM_022442, 5806
NM_022453, 988
NM_022458, 2464
NM_022461, 1086
NM_022485, 1045
NM_022550, 1638
NM_022551, 1946
NM_022552, 717
NM_022566, 4296
NM_022727, 5961
NM_022744, 4468
NM_022747, 4084
NM_022748, 2226
NM_022752, 5474
NM_022758, 1926
NM_022770, 4539
NM_022778, 107
NM_022839, 4290
NM_022963, 1838
NM_023009, 152
NM_023011, 3940
NM_023032, 3691
NM_023033, 3693
NM_023078, 2620
NM_023936, 4378
NM_023942, 2449
NM_024003, 6336
NM_024026, 3872
NM_024027, 645
NM_024029, 5250
NM_024031, 4458
NM_024033, 2427
NM_024040, 3047
NM_024045, 2957
NM_024048, 4470
NM_024067, 2186
NM_024068, 3643

NM_024070, 2335
NM_024089, 3935
NM_024098, 3218
NM_024099, 3236
NM_024104, 5323
NM_024111, 4148
NM_024294, 1924
NM_024297, 4672
NM_024299, 5865
NM_024319, 614
NM_024321, 5389
NM_024329, 62
NM_024330, 379
NM_024333, 5186
NM_024339, 4396
NM_024407, 5120
NM_024507, 4406
NM_024516, 4502
NM_024537, 3938
NM_024567, 2508
NM_024571, 4350
NM_024572, 719
NM_024586, 247
NM_024589, 4346
NM_024602, 206
NM_024603, 241
NM_024613, 2584
NM_024627, 5951
NM_024640, 137
NM_024653, 2373
NM_024658, 3960
NM_024664, 183
NM_024668, 1724
NM_024671, 4454
NM_024691, 5636
NM_024709, 603
NM_024748, 1526
NM_024824, 4057
NM_024844, 4955
NM_024854, 3529
NM_024855, 5769
NM_024863, 6248
NM_024881, 5321
NM_024900, 1491
NM_024918, 5757
NM_024942, 3095
NM_025070, 2541
NM_025072, 2772
NM_025108, 4411
NM_025129, 5534
NM_025150, 358
NM_025164, 3374
NM_025168, 1863
NM_025197, 4830
NM_025202, 1000
NM_025203, 678

NM_025204, 6109
NM_025205, 1414
NM_025207, 455
NM_025226, 499
NM_025232, 2503
NM_025233, 4859
NM_025234, 4270
NM_025241, 5190
NM_025263, 2007
NM_030567, 1826
NM_030573, 5965
NM_030579, 4553
NM_030587, 196
NM_030593, 5411
NM_030775, 3432
NM_030782, 1545
NM_030815, 5719
NM_030819, 4573
NM_030877, 5763
NM_030900, 2232
NM_030920, 332
NM_030921, 1272
NM_030925, 3910
NM_030926, 1009
NM_030935, 2331
NM_030973, 5532
NM_031157, 3612
NM_031206, 6210
NM_031213, 5138
NM_031228, 5642
NM_031229, 5640
NM_031243, 2212
NM_031263, 2708
NM_031289, 3496
NM_031300, 1832
NM_031417, 5506
NM_031434, 2456
NM_031443, 2234
NM_031453, 2902
NM_031459, 131
NM_031465, 3446
NM_031472, 3261
NM_031478, 4522
NM_031479, 3665
NM_031482, 1629
NM_031484, 3070
NM_031485, 5574
NM_031901, 336
NM_031925, 2304
NM_031942, 905
NM_031966, 1598
NM_031968, 5014
NM_031989, 3622
NM_031990, 5100
NM_031992, 2290
NM_032023, 2923

NM_032038, 4495	NM_032756, 222
NM_032088, 1770	NM_032792, 5631
NM_032092, 1772	NM_032799, 2763
NM_032112, 3031	NM_032814, 3812
NM_032140, 4571	NM_032822, 785
NM_032162, 4310	NM_032827, 810
NM_032164, 2340	NM_032864, 245
NM_032196, 4150	NM_032871, 3326
NM_032204, 5996	NM_032872, 122
NM_032207, 5317	NM_032873, 3415
NM_032211, 3068	NM_032890, 606
NM_032212, 843	NM_032904, 3794
NM_032219, 1370	NM_032905, 2893
NM_032227, 6257	NM_032907, 4248
NM_032271, 4388	NM_032928, 2860
NM_032280, 1642	NM_032929, 2081
NM_032288, 1354	NM_032933, 5037
NM_032292, 412	NM_032951, 2284
NM_032299, 3395	NM_032953, 2286
NM_032313, 1437	NM_032958, 2376
NM_032322, 4771	NM_032989, 3258
NM_032323, 402	NM_032997, 2949
NM_032324, 630	NM_032999, 2295
NM_032330, 4485	NM_033008, 1176
NM_032331, 1318	NM_033010, 1178
NM_032333, 2996	NM_033011, 2538
NM_032338, 3712	NM_033022, 2978
NM_032342, 2746	NM_033046, 796
NM_032343, 1235	NM_033070, 5937
NM_032350, 2163	NM_033161, 2828
NM_032361, 1814	NM_033197, 5729
NM_032376, 4854	NM_033219, 2730
NM_032377, 5262	NM_033251, 4635
NM_032379, 3346	NM_033296, 1404
NM_032383, 1280	NM_033301, 2635
NM_032390, 875	NM_033316, 1348
NM_032402, 1776	NM_033363, 5417
NM_032403, 1774	NM_033410, 4456
NM_032486, 4444	NM_033415, 5355
NM_032527, 5869	NM_033416, 878
NM_032565, 3914	NM_033421, 5787
NM_032626, 4440	NM_033440, 60
NM_032627, 5345	NM_033534, 15
NM_032635, 5393	NM_033544, 4315
NM_032636, 296	NM_033551, 1785
NM_032637, 1577	NM_052837, 426
NM_032642, 3434	NM_052848, 5451
NM_032656, 3851	NM_052859, 1157
NM_032667, 3240	NM_052862, 488
NM_032712, 5588	NM_052881, 5656
NM_032726, 990	NM_052886, 2602
NM_032737, 5157	NM_052936, 6251
NM_032738, 503	NM_052963, 2616
NM_032747, 3061	NM_052984, 3685
NM_032750, 1174	NM_053043, 2462
NM_032753, 5173	NM_053056, 3311

NM_053275, 3829
NM_054012, 2822
NM_054013, 1848
NM_054014, 5650
NM_054016, 95
NM_057089, 2363
NM_057161, 1890
NM_057169, 3790
NM_057174, 3188
NM_057182, 5376
NM_058164, 5230
NM_058179, 2703
NM_058192, 4366
NM_058193, 3422
NM_058195, 2653
NM_058196, 2657
NM_058199, 2836
NM_078467, 1912
NM_079423, 3648
NM_079425, 3650
NM_080424, 1016
NM_080425, 5828
NM_080426, 5832
NM_080491, 3342
NM_080592, 696
NM_080594, 4394
NM_080598, 1984
NM_080648, 3999
NM_080649, 4001
NM_080670, 1726
NM_080686, 1981
NM_080687, 3942
NM_080702, 1977
NM_080703, 1975
NM_080796, 5855
NM_080797, 5859
NM_080820, 5693
NM_080822, 4654
NM_106552, 670
NM_130398, 639
NM_130442, 2260
NM_130468, 4143
NM_130898, 434
NM_133330, 1376
NM_133332, 1380
NM_133373, 4885
NM_133375, 4222
NM_133436, 2357
NM_133480, 1051
NM_133481, 1053
NM_133483, 3676
NM_133503, 3742
NM_133504, 3744
NM_133505, 3746
NM_133506, 3750
NM_133507, 3748

NM_133627, 4786
NM_133629, 4790
NM_133630, 4788
NM_133637, 798
NM_133645, 2066
NM_134269, 6009
NM_134323, 3616
NM_134324, 3618
NM_134440, 5358
NM_138385, 1372
NM_138391, 545
NM_138427, 4739
NM_138434, 2451
NM_138443, 5060
NM_138483, 1037
NM_138578, 5713
NM_138614, 1125
NM_138699, 1406
NM_138801, 727
NM_138924, 5124

XM_001289, 524
XM_001299, 33
XM_001389, 1453
XM_001468, 342
XM_001472, 250
XM_001482, 3658
XM_001589, 24
XM_001616, 101
XM_001640, 126
XM_001807, 135
XM_001812, 134
XM_001826, 78
XM_001897, 486
XM_001914, 567
XM_001916, 568
XM_001958, 599
XM_002068, 523
XM_002105, 141
XM_002114, 113
XM_002217, 845
XM_002255, 1361
XM_002435, 700
XM_002447, 877
XM_002480, 680
XM_002540, 1006
XM_002611, 823
XM_002636, 964
XM_002647, 770
XM_002669, 946
XM_002674, 776
XM_002704, 853
XM_002727, 788
XM_002739, 779
XM_002742, 1036
XM_002828, 1143
XM_002854, 1187

XM_002855, 1186
XM_002859, 1274
XM_002899, 1127
XM_003213, 1162
XM_003222, 1119
XM_003245, 1136
XM_003305, 1451
XM_003435, 1432
XM_003477, 1530
XM_003511, 1448
XM_003555, 1500
XM_003611, 2083
XM_003716, 1811
XM_003771, 1644
XM_003789, 1712
XM_003825, 1540
XM_003830, 1666
XM_003841, 1699
XM_003869, 1572
XM_003896, 1581
XM_003937, 1710
XM_004009, 1565
XM_004098, 3704
XM_004151, 2065
XM_004256, 2114
XM_004297, 2113
XM_004330, 3194
XM_004379, 2122
XM_004383, 2130
XM_004526, 2110
XM_004627, 2402
XM_004901, 2292
XM_005060, 2605
XM_005086, 1042
XM_005100, 2908
XM_005180, 1332
XM_005305, 2485
XM_005348, 2755
XM_005365, 2760
XM_005490, 2707
XM_005525, 2727
XM_005543, 2666
XM_005675, 3103
XM_005698, 3053
XM_005724, 2878
XM_005938, 3058
XM_005969, 3088
XM_006139, 3127
XM_006170, 3201
XM_006212, 3167
XM_006290, 98
XM_006297, 3196
XM_006424, 3151
XM_006432, 3371
XM_006464, 3355
XM_006467, 3399

XM_006475, 3135
XM_006483, 3136
XM_006529, 3281
XM_006533, 3270
XM_006566, 3849
XM_006578, 3736
XM_006589, 3766
XM_006595, 3835
XM_006694, 3535
XM_006710, 3626
XM_006748, 3536
XM_006826, 3559
XM_006887, 3765
XM_006925, 3485
XM_006936, 3483
XM_006937, 5074
XM_006947, 3482
XM_006958, 3475
XM_007002, 3797
XM_007003, 3796
XM_007199, 3923
XM_007254, 4097
XM_007272, 4081
XM_007288, 3968
XM_007293, 3967
XM_007315, 3958
XM_007316, 3957
XM_007324, 4027
XM_007328, 4024
XM_007441, 4045
XM_007483, 4072
XM_007488, 4005
XM_007491, 3996
XM_007531, 4167
XM_007545, 4156
XM_007623, 4221
XM_007651, 4189
XM_007751, 4129
XM_007963, 4474
XM_007988, 4430
XM_008064, 4509
XM_008065, 4497
XM_008106, 4463
XM_008126, 4353
XM_008150, 4800
XM_008231, 4694
XM_008253, 4926
XM_008323, 4750
XM_008334, 4671
XM_008351, 4856
XM_008401, 4867
XM_008402, 4869
XM_008432, 4902
XM_008441, 4686
XM_008459, 4915
XM_008462, 4777

XM_008486, 4760
XM_008509, 4658
XM_008538, 4684
XM_008557, 4650
XM_008579, 4809
XM_008679, 4693
XM_008695, 5089
XM_008723, 5054
XM_008812, 5083
XM_008830, 5597
XM_008851, 5522
XM_008854, 5325
XM_008860, 5485
XM_008878, 5472
XM_008887, 5243
XM_008912, 5453
XM_008985, 5531
XM_009010, 5205
XM_009036, 5486
XM_009063, 5274
XM_009082, 5256
XM_009125, 5484
XM_009126, 5496
XM_009149, 5406
XM_009180, 5378
XM_009203, 5443
XM_009222, 5165
XM_009277, 5113
XM_009279, 5110
XM_009293, 5338
XM_009303, 5310
XM_009330, 5357
XM_009338, 5384
XM_009436, 5705
XM_009450, 5728
XM_009501, 5754
XM_009549, 5816
XM_009622, 5647
XM_009642, 5759
XM_009671, 5823
XM_009672, 5821
XM_009686, 5762
XM_009805, 5919
XM_009947, 6022
XM_009967, 6031
XM_009973, 6042
XM_010000, 6063
XM_010002, 6064
XM_010024, 6087
XM_010029, 6094
XM_010040, 6103
XM_010055, 6108
XM_010117, 6269
XM_010141, 6216
XM_010156, 5266
XM_010178, 6310

XM_010272, 6132
XM_010362, 6274
XM_010378, 6169
XM_010436, 6280
XM_010494, 3429
XM_010615, 253
XM_010636, 451
XM_010664, 133
XM_010682, 581
XM_010712, 182
XM_010732, 593
XM_010778, 925
XM_010852, 938
XM_010858, 1004
XM_010866, 992
XM_010881, 771
XM_010886, 755
XM_010938, 4641
XM_010941, 1433
XM_010953, 1130
XM_010978, 1290
XM_011074, 1320
XM_011089, 5076
XM_011117, 2059
XM_011118, 4941
XM_011129, 1423
XM_011160, 1365
XM_011548, 2411
XM_011618, 2400
XM_011629, 2533
XM_011642, 2586
XM_011650, 66
XM_011657, 2592
XM_011749, 2798
XM_011752, 2786
XM_011769, 2562
XM_011778, 2832
XM_011988, 3260
XM_012124, 3836
XM_012145, 3761
XM_012159, 3494
XM_012162, 3598
XM_012179, 5337
XM_012182, 3638
XM_012184, 3861
XM_012219, 3759
XM_012272, 3543
XM_012284, 2395
XM_012376, 3990
XM_012377, 3983
XM_012398, 4133
XM_012418, 4199
XM_012462, 4322
XM_012487, 4555
XM_012549, 4734
XM_012569, 4461

XM_012609, 4945
XM_012615, 4744
XM_012634, 4950
XM_012638, 3874
XM_012642, 4849
XM_012651, 4916
XM_012676, 4675
XM_012741, 5031
XM_012798, 5212
XM_012812, 5370
XM_012860, 5439
XM_012862, 5195
XM_012913, 5114
XM_012931, 5768
XM_012970, 5700
XM_013010, 6066
XM_013015, 6089
XM_013029, 6118
XM_013042, 6207
XM_013060, 6196
XM_013086, 6145
XM_013112, 2530
XM_013127, 2577
XM_015234, 75
XM_015241, 5088
XM_015243, 3148
XM_015258, 2244
XM_015366, 4239
XM_015434, 547
XM_015462, 1208
XM_015468, 3596
XM_015476, 3585
XM_015481, 3580
XM_015516, 6206
XM_015563, 1525
XM_015652, 2937
XM_015697, 5264
XM_015700, 4478
XM_015705, 3214
XM_015717, 257
XM_015755, 5046
XM_015769, 5369
XM_015835, 4311
XM_015840, 3921
XM_015842, 3932
XM_015920, 909
XM_015922, 911
XM_016047, 2604
XM_016076, 4237
XM_016093, 2992
XM_016113, 2712
XM_016125, 6275
XM_016139, 3170
XM_016164, 276
XM_016170, 1554
XM_016199, 600

XM_016288, 880
XM_016308, 2726
XM_016334, 1294
XM_016345, 1799
XM_016351, 3924
XM_016378, 5364
XM_016382, 5036
XM_016410, 5438
XM_016480, 326
XM_016486, 4071
XM_016487, 4068
XM_016605, 3708
XM_016625, 773
XM_016640, 3538
XM_016674, 1652
XM_016700, 2433
XM_016713, 4165
XM_016733, 2256
XM_016843, 766
XM_016857, 1941
XM_016871, 5180
XM_016985, 4213
XM_017080, 3436
XM_017096, 4644
XM_017204, 5240
XM_017234, 4712
XM_017240, 4135
XM_017315, 67
XM_017356, 1291
XM_017364, 1105
XM_017369, 3394
XM_017432, 3895
XM_017442, 2313
XM_017474, 1679
XM_017483, 2280
XM_017508, 3710
XM_017517, 2080
XM_017578, 4980
XM_017591, 1701
XM_017641, 1544
XM_017698, 861
XM_017816, 2581
XM_017831, 2119
XM_017846, 109
XM_017857, 1640
XM_017914, 3953
XM_017925, 1476
XM_017930, 6284
XM_017931, 2659
XM_017971, 4319
XM_017984, 4338
XM_017996, 2711
XM_018006, 2710
XM_018019, 6157
XM_018039, 784
XM_018041, 642

XM_018054, 4123
XM_018088, 4472
XM_018108, 6313
XM_018109, 6315
XM_018136, 161
XM_018142, 6232
XM_018149, 1264
XM_018167, 3015
XM_018182, 2098
XM_018205, 64
XM_018241, 6161
XM_018279, 3057
XM_018287, 2595
XM_018301, 763
XM_018332, 314
XM_018359, 2281
XM_018399, 3918
XM_018432, 4331
XM_018473, 1658
XM_018515, 5354
XM_018523, 1359
XM_018534, 4840
XM_018539, 6014
XM_018540, 841
XM_026944, 2787
XM_026951, 2771
XM_026968, 2769
XM_026985, 2766
XM_026987, 2765
XM_027102, 3802
XM_027143, 6106
XM_027161, 1220
XM_027214, 2385
XM_027309, 4329
XM_027313, 226
XM_027365, 4334
XM_027412, 4368
XM_027440, 2505
XM_027558, 4352
XM_027651, 2490
XM_027679, 2488
XM_027825, 4661
XM_027904, 5548
XM_027916, 76
XM_027952, 6353
XM_027963, 936
XM_027964, 1619
XM_027983, 213
XM_028034, 940
XM_028064, 5119
XM_028067, 5117
XM_028151, 4562
XM_028192, 3117
XM_028263, 5488
XM_028267, 5491
XM_028322, 4075

XM_028347, 4074
XM_028358, 4073
XM_028398, 4667
XM_028417, 4678
XM_028643, 3624
XM_028662, 3561
XM_028666, 5383
XM_028672, 5382
XM_028744, 5025
XM_028760, 3554
XM_028783, 5851
XM_028806, 5765
XM_028810, 5766
XM_028834, 5863
XM_028848, 4390
XM_028918, 5867
XM_028966, 5871
XM_029031, 169
XM_029096, 1539
XM_029104, 1314
XM_029132, 1313
XM_029136, 1310
XM_029168, 2841
XM_029187, 6194
XM_029228, 2069
XM_029288, 4067
XM_029369, 1198
XM_029438, 4656
XM_029450, 5404
XM_029455, 5403
XM_029461, 6282
XM_029567, 2609
XM_029631, 3602
XM_029728, 3595
XM_029746, 2128
XM_029805, 3507
XM_029810, 5776
XM_029822, 5778
XM_029842, 176
XM_029844, 145
XM_030044, 5796
XM_030203, 1028
XM_030268, 2543
XM_030274, 2544
XM_030326, 3187
XM_030373, 6233
XM_030417, 1112
XM_030423, 154
XM_030447, 3065
XM_030470, 68
XM_030485, 5159
XM_030529, 862
XM_030582, 883
XM_030621, 5818
XM_030699, 5834
XM_030714, 5145

XM_030720, 5137
XM_030721, 5135
XM_030771, 1821
XM_030777, 1823
XM_030782, 1824
XM_030812, 1256
XM_030834, 952
XM_030895, 5465
XM_030901, 5456
XM_030914, 5450
XM_030920, 40
XM_031025, 4032
XM_031074, 4039
XM_031251, 5307
XM_031263, 5305
XM_031273, 5303
XM_031276, 5302
XM_031292, 4295
XM_031320, 1445
XM_031345, 5292
XM_031354, 4292
XM_031404, 4285
XM_031415, 4767
XM_031427, 4769
XM_031466, 4765
XM_031515, 4147
XM_031519, 731
XM_031527, 733
XM_031536, 4758
XM_031554, 4145
XM_031585, 782
XM_031586, 783
XM_031596, 780
XM_031617, 4138
XM_031626, 738
XM_031718, 4159
XM_031807, 3491
XM_031857, 5184
XM_031866, 3041
XM_031890, 3044
XM_031917, 5176
XM_031944, 5066
XM_031949, 3049
XM_031992, 3059
XM_032020, 5281
XM_032121, 2455
XM_032201, 4836
XM_032216, 2454
XM_032269, 1221
XM_032285, 5399
XM_032391, 216
XM_032403, 4180
XM_032443, 3930
XM_032476, 2976
XM_032520, 2970
XM_032553, 1626

XM_032588, 3457
XM_032614, 3462
XM_032710, 5247
XM_032719, 5248
XM_032724, 5252
XM_032759, 1700
XM_032766, 4864
XM_032774, 5257
XM_032782, 5261
XM_032813, 4863
XM_032817, 4861
XM_032852, 4857
XM_032895, 1590
XM_032902, 1588
XM_032930, 6189
XM_032944, 2470
XM_032996, 5943
XM_033015, 5902
XM_033016, 5903
XM_033090, 5946
XM_033147, 6241
XM_033227, 3450
XM_033232, 6351
XM_033251, 3959
XM_033263, 3472
XM_033294, 1123
XM_033337, 3964
XM_033355, 2819
XM_033359, 2818
XM_033360, 2817
XM_033361, 2815
XM_033362, 2811
XM_033380, 2809
XM_033385, 2808
XM_033391, 3969
XM_033424, 2774
XM_033435, 3975
XM_033445, 3980
XM_033457, 2777
XM_033460, 2778
XM_033553, 3991
XM_033595, 3994
XM_033654, 79
XM_033683, 77
XM_033689, 4646
XM_033714, 4645
XM_033813, 5960
XM_033862, 6173
XM_033876, 2383
XM_033878, 6172
XM_033884, 6170
XM_033910, 2134
XM_033912, 2132
XM_033922, 4606
XM_034000, 501
XM_034082, 454

XM_034321, 1502	XM_036465, 4825
XM_034375, 4460	XM_036500, 573
XM_034377, 5623	XM_036507, 575
XM_034431, 3185	XM_036528, 4410
XM_034586, 4376	XM_036556, 566
XM_034590, 4380	XM_036593, 2939
XM_034640, 2638	XM_036659, 4707
XM_034662, 319	XM_036680, 4342
XM_034671, 318	XM_036727, 4134
XM_034710, 1466	XM_036744, 433
XM_034713, 1468	XM_036755, 5927
XM_034744, 1655	XM_036785, 4982
XM_034862, 1675	XM_036829, 442
XM_034890, 4184	XM_036845, 450
XM_034897, 4256	XM_036934, 448
XM_034935, 6201	XM_036937, 5969
XM_034952, 857	XM_036938, 1197
XM_034953, 4116	XM_037002, 1668
XM_035014, 4119	XM_037056, 2107
XM_035103, 2824	XM_037101, 873
XM_035107, 2439	XM_037108, 831
XM_035109, 2825	XM_037147, 3212
XM_035220, 800	XM_037173, 3202
XM_035368, 2626	XM_037195, 4988
XM_035370, 2631	XM_037196, 4987
XM_035373, 2629	XM_037202, 5840
XM_035465, 6123	XM_037206, 5842
XM_035485, 3571	XM_037217, 5846
XM_035490, 3564	XM_037260, 1608
XM_035497, 3562	XM_037329, 591
XM_035572, 1392	XM_037377, 1300
XM_035625, 5197	XM_037381, 1299
XM_035627, 5196	XM_037423, 1163
XM_035636, 5194	XM_037468, 6114
XM_035638, 5192	XM_037474, 6116
XM_035640, 5034	XM_037565, 5106
XM_035662, 2483	XM_037572, 5109
XM_035680, 2482	XM_037600, 1304
XM_035824, 1402	XM_037657, 2608
XM_035919, 5612	XM_037662, 5372
XM_035986, 1456	XM_037682, 5977
XM_035999, 5907	XM_037741, 2276
XM_036002, 1440	XM_037778, 4244
XM_036011, 5910	XM_037797, 5981
XM_036042, 5913	XM_037808, 3263
XM_036087, 5917	XM_037875, 2045
XM_036104, 4965	XM_037945, 5993
XM_036107, 5923	XM_037971, 4897
XM_036115, 4971	XM_038030, 2855
XM_036118, 1262	XM_038049, 2864
XM_036175, 5924	XM_038063, 2866
XM_036299, 155	XM_038098, 5343
XM_036339, 3178	XM_038146, 5339
XM_036413, 2469	XM_038221, 1695
XM_036450, 664	XM_038243, 1341
XM_036462, 4827	XM_038308, 3737

XM_038371, 3902
XM_038391, 2757
XM_038424, 5018
XM_038536, 2909
XM_038576, 734
XM_038584, 6019
XM_038659, 3533
XM_038791, 3841
XM_038852, 244
XM_038872, 5062
XM_038911, 237
XM_038946, 1840
XM_039165, 1413
XM_039173, 1416
XM_039176, 1417
XM_039225, 4125
XM_039236, 6047
XM_039248, 6051
XM_039306, 4551
XM_039339, 6060
XM_039372, 6065
XM_039395, 3732
XM_039474, 4794
XM_039654, 2646
XM_039702, 4200
XM_039712, 716
XM_039721, 321
XM_039723, 5140
XM_039796, 1292
XM_039805, 1258
XM_039908, 5598
XM_039910, 4721
XM_039921, 4732
XM_039952, 1213
XM_039975, 1783
XM_040009, 377
XM_040066, 6088
XM_040095, 6091
XM_040221, 3707
XM_040267, 2879
XM_040272, 2876
XM_040321, 1524
XM_040498, 2417
XM_040623, 2074
XM_040644, 3734
XM_040709, 315
XM_040752, 1493
XM_040853, 2218
XM_040898, 4100
XM_040942, 4094
XM_040952, 4090
XM_041014, 4086
XM_041020, 2697
XM_041059, 1670
XM_041100, 3503
XM_041209, 3925

XM_041211, 1161
XM_041221, 1410
XM_041235, 4008
XM_041248, 6111
XM_041473, 3928
XM_041484, 3944
XM_041507, 1147
XM_041583, 4957
XM_041678, 5027
XM_041694, 1614
XM_041712, 1592
XM_041872, 5090
XM_041879, 353
XM_041884, 354
XM_041921, 6304
XM_041964, 4680
XM_042018, 5095
XM_042025, 1600
XM_042153, 6348
XM_042155, 6346
XM_042168, 1286
XM_042301, 1474
XM_042326, 1032
XM_042422, 2145
XM_042473, 2148
XM_042618, 1229
XM_042621, 4596
XM_042658, 2561
XM_042695, 1364
XM_042698, 4710
XM_042765, 5701
XM_042781, 2434
XM_042788, 2744
XM_042841, 1072
XM_042852, 3339
XM_042860, 1070
XM_042963, 6295
XM_042967, 537
XM_042968, 6297
XM_043047, 4577
XM_043173, 866
XM_043220, 3111
XM_043340, 1805
XM_043388, 1808
XM_043589, 2998
XM_043605, 2999
XM_043614, 6099
XM_043643, 6250
XM_043771, 1568
XM_044075, 416
XM_044077, 391
XM_044127, 398
XM_044128, 408
XM_044166, 406
XM_044172, 411
XM_044334, 3859

XM_044354, 2968
XM_044367, 4938
XM_044372, 4943
XM_044376, 4935
XM_044394, 4927
XM_044426, 4924
XM_044523, 4304
XM_044533, 4307
XM_044565, 4269
XM_044569, 4272
XM_044593, 4278
XM_044608, 5213
XM_044619, 5210
XM_044627, 2563
XM_044866, 2139
XM_044914, 5658
XM_044915, 5660
XM_044932, 3129
XM_044957, 3131
XM_045010, 3821
XM_045044, 4749
XM_045104, 4989
XM_045140, 2973
XM_045151, 5226
XM_045170, 928
XM_045183, 4651
XM_045187, 3833
XM_045283, 757
XM_045290, 1214
XM_045296, 2759
XM_045401, 2403
XM_045418, 5667
XM_045451, 5671
XM_045460, 5674
XM_045499, 3276
XM_045525, 3278
XM_045535, 4751
XM_045551, 4752
XM_045581, 4996
XM_045602, 3856
XM_045612, 3273
XM_045613, 3271
XM_045642, 3269
XM_045667, 3074
XM_045681, 4287
XM_045750, 3157
XM_045802, 3826
XM_045856, 2407
XM_045901, 4852
XM_045952, 2413
XM_045963, 3834
XM_046001, 2414
XM_046035, 4453
XM_046041, 3726
XM_046057, 1443
XM_046090, 5423

XM_046160, 5708
XM_046179, 5710
XM_046313, 5544
XM_046349, 187
XM_046401, 1085
XM_046419, 5578
XM_046450, 201
XM_046464, 522
XM_046472, 5004
XM_046481, 4999
XM_046520, 5689
XM_046551, 212
XM_046557, 208
XM_046565, 204
XM_046642, 3951
XM_046648, 3950
XM_046651, 3949
XM_046743, 3035
XM_046765, 5020
XM_046767, 5022
XM_046769, 5021
XM_046822, 5150
XM_046836, 2722
XM_046863, 2720
XM_046918, 112
XM_046932, 4958
XM_046934, 5160
XM_047007, 5723
XM_047011, 5725
XM_047018, 5727
XM_047024, 6177
XM_047032, 6176
XM_047083, 2521
XM_047175, 690
XM_047374, 5446
XM_047376, 5445
XM_047409, 5444
XM_047436, 4624
XM_047477, 1429
XM_047479, 495
XM_047499, 610
XM_047525, 4632
XM_047545, 616
XM_047561, 1137
XM_047584, 5131
XM_047600, 5132
XM_047964, 1798
XM_048088, 753
XM_048119, 4344
XM_048258, 5385
XM_048286, 3255
XM_048351, 5218
XM_048364, 5219
XM_048404, 6329
XM_048410, 6328
XM_048420, 6325

XM_048471, 5082
XM_048479, 2679
XM_048518, 2684
XM_048539, 2686
XM_048603, 3674
XM_048654, 4829
XM_048690, 1007
XM_048780, 57
XM_048859, 2881
XM_048905, 6306
XM_048943, 3640
XM_048957, 3931
XM_048991, 3642
XM_049048, 3652
XM_049108, 820
XM_049113, 822
XM_049116, 818
XM_049141, 3586
XM_049148, 3581
XM_049150, 3659
XM_049197, 3161
XM_049201, 3772
XM_049211, 3771
XM_049226, 2623
XM_049237, 5391
XM_049247, 2618
XM_049282, 5223
XM_049310, 139
XM_049337, 6320
XM_049354, 4275
XM_049372, 4317
XM_049421, 2637
XM_049502, 5236
XM_049561, 5239
XM_049663, 3493
XM_049680, 476
XM_049690, 483
XM_049742, 14
XM_049795, 3082
XM_049899, 2121
XM_049904, 3937
XM_049920, 5482
XM_049931, 4995
XM_049934, 4994
XM_049937, 4818
XM_050074, 3528
XM_050101, 4773
XM_050159, 4880
XM_050194, 4462
XM_050200, 1487
XM_050215, 2525
XM_050236, 5602
XM_050265, 2278
XM_050278, 4103
XM_050293, 2487
XM_050403, 6192

XM_050430, 2389
XM_050435, 5227
XM_050506, 2583
XM_050534, 4348
XM_050552, 1234
XM_050589, 5603
XM_050638, 979
XM_050660, 5330
XM_050731, 2571
XM_050891, 984
XM_050962, 975
XM_050964, 4220
XM_051219, 4479
XM_051264, 1237
XM_051298, 2612
XM_051364, 5290
XM_051430, 3398
XM_051435, 3358
XM_051463, 4230
XM_051471, 6238
XM_051476, 6237
XM_051489, 3367
XM_051518, 1131
XM_051556, 6
XM_051586, 5092
XM_051712, 4025
XM_051716, 3373
XM_051763, 4727
XM_051778, 4600
XM_051860, 4298
XM_051877, 515
XM_052113, 3378
XM_052310, 1060
XM_052313, 1535
XM_052336, 1477
XM_052460, 3714
XM_052474, 3719
XM_052530, 1424
XM_052542, 3755
XM_052626, 1398
XM_052635, 5166
XM_052641, 3769
XM_052661, 5168
XM_052721, 2056
XM_052725, 2784
XM_052786, 3153
XM_052862, 3404
XM_052893, 3825
XM_052974, 608
XM_052989, 817
XM_053074, 5430
XM_053122, 1363
XM_053164, 3641
XM_053183, 58
XM_053206, 2875
XM_053245, 400

XM_053323, 1078
XM_053585, 4252
XM_053633, 544
XM_053712, 1074
XM_053717, 4663
XM_053787, 3283
XM_053796, 3288
XM_053952, 3722
XM_053955, 1859
XM_054038, 4832
XM_054098, 6183
XM_054221, 6155
XM_054344, 4973
XM_054474, 2933
XM_054475, 2935
XM_054520, 1047
XM_054566, 5926
XM_054706, 2146
XM_054752, 2849
XM_054763, 2852
XM_054856, 3193
XM_054868, 228
XM_054900, 4309
XM_054978, 295
XM_055013, 3853
XM_055061, 4826
XM_055132, 4514
XM_055195, 4427
XM_055199, 4942
XM_055230, 5336
XM_055254, 954
XM_055369, 3397
XM_055481, 251
XM_055551, 1461
XM_055573, 3086
XM_055641, 2064
XM_055658, 5592
XM_055686, 5163
XM_055771, 4505
XM_055859, 5483
XM_055880, 583
XM_055993, 5646
XM_056035, 5678
XM_056082, 4648
XM_056260, 4438
XM_056286, 5582
XM_056315, 1723
XM_056317, 4077
XM_056346, 3645
XM_056353, 3662
XM_056421, 5175
XM_056481, 3545
XM_056602, 5408
XM_056681, 3700
XM_056730, 4775
XM_056884, 618

XM_056923, 521
XM_056957, 1471
XM_056963, 1793
XM_056970, 628
XM_056996, 3798
XM_057020, 4257
XM_057074, 5260
XM_057150, 4619
XM_057236, 5756
XM_057374, 5793
XM_057492, 1548
XM_057664, 740
XM_057780, 2557
XM_057994, 1541
XM_058039, 1934
XM_058098, 986
XM_058116, 4526
XM_058125, 5635
XM_058210, 4018
XM_058232, 5225
XM_058240, 102
XM_058247, 466
XM_058266, 2144
XM_058267, 1278
XM_058343, 3020
XM_058361, 3078
XM_058405, 552
XM_058406, 3084
XM_058414, 3159
XM_058450, 3352
XM_058505, 3125
XM_058528, 3671
XM_058556, 3773
XM_058567, 3504
XM_058574, 3454
XM_058602, 3022
XM_058611, 3926
XM_058618, 4091
XM_058636, 4118
XM_058646, 3986
XM_058647, 3978
XM_058677, 4061
XM_058684, 4186
XM_058699, 4250
XM_058702, 294
XM_058739, 4621
XM_058745, 4543
XM_058784, 4404
XM_058796, 4337
XM_058830, 4803
XM_058867, 4755
XM_058900, 4730
XM_058918, 5949
XM_058927, 1441
XM_058949, 5463
XM_058967, 5295

XM_058968, 2619
XM_058977, 3920
XM_058987, 5570
XM_058990, 5584
XM_058991, 5552
XM_059045, 5419
XM_059052, 5447
XM_059066, 114
XM_059067, 120
XM_059088, 130
XM_059094, 465
XM_059117, 103
XM_059120, 562
XM_059133, 224
XM_059171, 171
XM_059180, 256
XM_059191, 492
XM_059201, 1
XM_059210, 330
XM_059214, 185
XM_059230, 55
XM_059268, 5675
XM_059321, 5607
XM_059335, 6013
XM_059351, 920
XM_059368, 653
XM_059372, 1029
XM_059422, 968
XM_059461, 971
XM_059465, 907
XM_059516, 1266
XM_059557, 1068
XM_059561, 1059
XM_059583, 1252
XM_059593, 1434
XM_059623, 1519
XM_059628, 1442
XM_059633, 1469
XM_059637, 2804
XM_059653, 1596
XM_059669, 1617
XM_059709, 1604
XM_059720, 2914
XM_059741, 2118
XM_059745, 2131
XM_059773, 2141
XM_059776, 2062
XM_059801, 1939
XM_059839, 2430
XM_059876, 2282
XM_059933, 2531
XM_059945, 2838
XM_059961, 2859
XM_059966, 2871
XM_059979, 2644
XM_059986, 2813

XM_059998, 2673
XM_060006, 2647
XM_060012, 4115
XM_060030, 6146
XM_060042, 4281
XM_060067, 1499
XM_060331, 509
XM_060517, 531
XM_060976, 2885
XM_061125, 2931
XM_061126, 2930
XM_062437, 3775
XM_063639, 4234
XM_064091, 4597
XM_065884, 777
XM_066291, 5998
XM_066900, 6261
XM_067264, 1240
XM_067325, 5030
XM_067715, 1169
XM_068164, 1497
XM_068395, 1789
XM_068853, 1714
XM_068919, 2085
XM_068963, 2072
XM_070188, 2480
XM_070203, 2473
XM_070873, 2742
XM_071178, 2705
XM_071580, 1557
XM_071605, 2381
XM_071623, 1439
XM_071801, 4122
XM_071873, 4630
XM_071937, 2152
XM_072173, 5876
XM_072430, 2387
XM_072526, 2857
XM_076414, 1199
XM_083842, 3026
XM_083852, 3141
XM_083864, 3774
XM_083866, 3715
XM_083868, 3590
XM_083892, 3787
XM_083939, 4364
XM_083966, 4923
XM_083983, 4881
XM_084007, 5055
XM_084014, 5246
XM_084023, 5528
XM_084026, 5549
XM_084055, 580
XM_084084, 6090
XM_084110, 1340
XM_084111, 1243

XM_084120, 1315
XM_084123, 1263
XM_084129, 1231
XM_084141, 1041
XM_084158, 1465
XM_084168, 1547
XM_084179, 1591
XM_084180, 1781
XM_084204, 2079
XM_084238, 2453
XM_084241, 2337
XM_084270, 2851
XM_084283, 6229
XM_084287, 6203
XM_084288, 6153
XM_084296, 6227
XM_084311, 6350
XM_084359, 3073
XM_084372, 3016
XM_084385, 2944
XM_084413, 3028
XM_084420, 2910
XM_084429, 2911
XM_084450, 2942
XM_084451, 2953
XM_084467, 2994
XM_084477, 3010
XM_084480, 3012
XM_084505, 3080
XM_084514, 3180
XM_084515, 3183
XM_084516, 3182
XM_084517, 3184
XM_084522, 3424
XM_084525, 3428
XM_084527, 3169
XM_084570, 3357
XM_084601, 3353
XM_084610, 3350
XM_084632, 3072
XM_084645, 3731
XM_084654, 3388
XM_084658, 3382
XM_084681, 3195
XM_084702, 3287
XM_084739, 3124
XM_084742, 3122
XM_084770, 3515
XM_084789, 3599
XM_084800, 3783
XM_084801, 3672
XM_084807, 3531
XM_084808, 3818
XM_084824, 3630
XM_084841, 3540
XM_084866, 3557

XM_084884, 3583
XM_084885, 3582
XM_084889, 3814
XM_084901, 3488
XM_084909, 3702
XM_084912, 3705
XM_084918, 3500
XM_084922, 3495
XM_084941, 3788
XM_084946, 3800
XM_084948, 3804
XM_084982, 3870
XM_084997, 3933
XM_084998, 2142
XM_085017, 3893
XM_085044, 3916
XM_085065, 4044
XM_085066, 4033
XM_085068, 1480
XM_085106, 3987
XM_085125, 4031
XM_085127, 4014
XM_085141, 4019
XM_085151, 4050
XM_085162, 4054
XM_085166, 3955
XM_085203, 4130
XM_085204, 4132
XM_085215, 4282
XM_085239, 4254
XM_085249, 4236
XM_085262, 4314
XM_085280, 4289
XM_085283, 4211
XM_085307, 4160
XM_085327, 4622
XM_085340, 4448
XM_085393, 4480
XM_085395, 4482
XM_085408, 4637
XM_085434, 4524
XM_085442, 4513
XM_085445, 4425
XM_085452, 4435
XM_085471, 4558
XM_085475, 4561
XM_085483, 4616
XM_085525, 4323
XM_085531, 4977
XM_085545, 4741
XM_085548, 4735
XM_085563, 4991
XM_085581, 472
XM_085589, 4948
XM_085613, 4724
XM_085627, 4951

XM_085636, 4873
XM_085672, 4757
XM_085687, 4659
XM_085691, 4677
XM_085716, 4992
XM_085722, 4745
XM_085735, 5019
XM_085743, 4718
XM_085775, 5058
XM_085779, 5075
XM_085788, 5049
XM_085789, 5043
XM_085790, 5045
XM_085791, 5042
XM_085856, 5501
XM_085862, 5244
XM_085874, 5460
XM_085875, 5461
XM_085876, 5462
XM_085909, 5297
XM_085916, 5285
XM_085917, 5276
XM_085927, 5527
XM_085928, 5489
XM_085934, 5537
XM_085935, 5573
XM_085950, 5487
XM_085971, 5371
XM_085972, 5629
XM_085981, 4599
XM_085986, 5398
XM_086004, 5425
XM_086074, 5311
XM_086101, 5128
XM_086102, 5130
XM_086116, 5331
XM_086132, 304
XM_086138, 282
XM_086142, 557
XM_086151, 46
XM_086164, 277
XM_086165, 279
XM_086166, 281
XM_086167, 280
XM_086178, 4
XM_086180, 19
XM_086204, 38
XM_086228, 1356
XM_086244, 601
XM_086245, 602
XM_086257, 632
XM_086271, 383
XM_086278, 4434
XM_086282, 543
XM_086296, 331
XM_086324, 214

XM_086328, 542
XM_086343, 265
XM_086357, 85
XM_086360, 29
XM_086375, 97
XM_086378, 485
XM_086381, 479
XM_086384, 178
XM_086389, 243
XM_086391, 231
XM_086397, 323
XM_086400, 366
XM_086428, 2161
XM_086431, 589
XM_086432, 592
XM_086444, 136
XM_086481, 490
XM_086484, 494
XM_086485, 493
XM_086494, 538
XM_086515, 324
XM_086518, 317
XM_086543, 190
XM_086552, 432
XM_086564, 388
XM_086567, 430
XM_086586, 52
XM_086587, 54
XM_086648, 5819
XM_086701, 5687
XM_086710, 5670
XM_086715, 5695
XM_086736, 5717
XM_086745, 5712
XM_086759, 5877
XM_086760, 5878
XM_086770, 5914
XM_086773, 5928
XM_086777, 5930
XM_086779, 5064
XM_086805, 5963
XM_086809, 5953
XM_086821, 5985
XM_086830, 6043
XM_086844, 6074
XM_086873, 5964
XM_086875, 6093
XM_086920, 805
XM_086923, 849
XM_086925, 850
XM_086944, 933
XM_086950, 858
XM_086961, 926
XM_086980, 791
XM_087028, 942
XM_087038, 2803

XM_087040, 842	XM_087686, 1543
XM_087041, 2800	XM_087710, 3247
XM_087045, 932	XM_087713, 1559
XM_087051, 748	XM_087745, 1656
XM_087061, 912	XM_087773, 1816
XM_087062, 914	XM_087790, 1631
XM_087068, 775	XM_087823, 1858
XM_087069, 772	XM_087834, 2123
XM_087118, 891	XM_087836, 2124
XM_087122, 839	XM_087853, 2090
XM_087151, 683	XM_087855, 2089
XM_087162, 985	XM_087939, 2000
XM_087166, 993	XM_087945, 1990
XM_087181, 965	XM_087955, 3857
XM_087193, 726	XM_087960, 1883
XM_087195, 725	XM_087990, 1936
XM_087206, 669	XM_087991, 2154
XM_087211, 743	XM_088009, 3106
XM_087218, 1011	XM_088020, 1621
XM_087240, 901	XM_088073, 2386
XM_087254, 1302	XM_088099, 2416
XM_087268, 1203	XM_088103, 2418
XM_087278, 1358	XM_088105, 2409
XM_087284, 1075	XM_088107, 605
XM_087289, 1323	XM_088119, 2422
XM_087295, 1322	XM_088122, 2420
XM_087297, 1360	XM_088135, 2446
XM_087322, 1312	XM_088180, 2352
XM_087331, 1211	XM_088239, 2297
XM_087341, 1267	XM_088264, 2195
XM_087342, 1265	XM_088294, 2529
XM_087346, 1115	XM_088316, 2611
XM_087349, 1106	XM_088321, 2628
XM_087359, 1343	XM_088323, 2574
XM_087370, 1101	XM_088325, 2572
XM_087392, 1333	XM_088336, 2519
XM_087410, 1347	XM_088338, 2515
XM_087448, 1184	XM_088370, 2613
XM_087480, 3000	XM_088399, 2559
XM_087498, 1463	XM_088401, 2560
XM_087514, 1483	XM_088422, 2839
XM_087527, 1455	XM_088426, 2833
XM_087583, 1418	XM_088459, 2847
XM_087588, 1120	XM_088461, 2870
XM_087597, 1549	XM_088472, 1472
XM_087599, 1551	XM_088550, 2640
XM_087600, 1553	XM_088552, 2641
XM_087601, 1550	XM_088553, 2642
XM_087610, 1597	XM_088563, 2672
XM_087611, 1595	XM_088569, 2748
XM_087614, 1564	XM_088571, 2750
XM_087621, 1711	XM_088587, 4120
XM_087635, 1660	XM_088588, 4114
XM_087637, 1662	XM_088589, 4121
XM_087652, 1713	XM_088592, 6311
XM_087659, 1537	XM_088619, 6151

XM_088622, 6152
XM_088630, 6209
XM_088637, 2700
XM_088638, 768
XM_088665, 6158
XM_088688, 6220
XM_088689, 6218
XM_088710, 6253
XM_088736, 6265
XM_088738, 6267
XM_088739, 6268
XM_088745, 6289
XM_088747, 6128
XM_088788, 338
XM_088863, 286
XM_088945, 507
XM_089030, 622
XM_089138, 254
XM_089514, 3019
XM_089551, 3006
XM_090218, 3542
XM_090413, 3779
XM_090458, 3767
XM_090833, 638
XM_090914, 4082
XM_090991, 4191
XM_091076, 1091
XM_091100, 4263
XM_091108, 4124
XM_091159, 4157
XM_091270, 4483
XM_091399, 4590
XM_091420, 4544
XM_091786, 3426
XM_091886, 5595
XM_091938, 5221
XM_091981, 5586
XM_091984, 5396
XM_092042, 5108
XM_092046, 5341
XM_092049, 5380
XM_092135, 672
XM_092158, 918
XM_092346, 944
XM_092489, 867
XM_092517, 676
XM_092545, 970
XM_092760, 5696
XM_092888, 5986
XM_092966, 6113
XM_093050, 6212
XM_093130, 6226
XM_093219, 6299
XM_093241, 6228
XM_093423, 1308
XM_093487, 1255

XM_093546, 1201
XM_093624, 1083
XM_094243, 1797
XM_094440, 1561
XM_094741, 1862
XM_094855, 2060
XM_095146, 2432
XM_095371, 2475
XM_095545, 2514
XM_095667, 2554
XM_096038, 3699
XM_096060, 4241
XM_096146, 3539
XM_096149, 661
XM_096155, 5967
XM_096156, 5968
XM_096169, 1022
XM_096172, 787
XM_096195, 1190
XM_096198, 1117
XM_096203, 1464
XM_096303, 6256
XM_096486, 3315
XM_096520, 3165
XM_096544, 3119
XM_096566, 3680
XM_096572, 3819
XM_096597, 3739
XM_096606, 3608
XM_096620, 3578
XM_096630, 3486
XM_096661, 3441
XM_096744, 4034
XM_096772, 3966
XM_096842, 4245
XM_096844, 4286
XM_097043, 4984
XM_097193, 5001
XM_097195, 5000
XM_097204, 4754
XM_097232, 5048
XM_097274, 5510
XM_097275, 5521
XM_097300, 5222
XM_097365, 5440
XM_097420, 5134
XM_097453, 2068
XM_097519, 561
XM_097565, 249
XM_097639, 352
XM_097649, 198
XM_097713, 5800
XM_097727, 5773
XM_097731, 5795
XM_097749, 5644
XM_097772, 5731

XM_097807, 5929

XM_097817, 5925

XM_097833, 5950

XM_097886, 5971

XM_097976, 715

XM_098004, 729

XM_098047, 962

XM_098048, 960

XM_098109, 1345

XM_098111, 1245

XM_098154, 1232

XM_098158, 1103

XM_098173, 1227

XM_098248, 1384

XM_098351, 1609

XM_098352, 1611

XM_098354, 1610

XM_098362, 1634

XM_098387, 1778

XM_098405, 1534

XM_098468, 2108

XM_098599, 619

XM_098654, 2447

XM_098669, 2466

XM_098747, 2582

XM_098761, 2564

XM_098913, 2843

XM_098943, 2725

XM_098995, 6302

XM_099467, 363

XM_102377, 4432

XM_103946, 665

XM_104983, 6263

XM_105236, 1289

XM_105658, 1325

XM_106246, 1520

XM_106739, 1562

XM_107825, 2225

XM_109162, 3075

XM_113223, 3268

XM_113224, 3275

XM_113226, 3400

XM_113229, 3366

XM_113230, 3363

XM_113238, 3152

XM_113266, 4202

XM_113268, 4207

XM_113291, 4429

XM_113293, 4467

XM_113299, 4504

XM_113303, 5013

XM_113310, 4723

XM_113315, 4944

XM_113324, 4674

XM_113325, 4703

XM_113328, 4695

XM_113330, 5011

XM_113334, 4819

XM_113343, 5028

XM_113348, 5316

XM_113352, 5294

XM_113360, 386

XM_113361, 598

XM_113369, 361

XM_113374, 140

XM_113379, 473

XM_113380, 5749

XM_113390, 929

XM_113395, 1193

XM_113397, 1244

XM_113405, 1140

XM_113408, 1296

XM_113409, 1202

XM_113410, 1088

XM_113417, 1254

XM_113422, 1329

XM_113425, 1452

XM_113452, 1556

XM_113454, 1841

XM_113463, 1654

XM_113467, 1720

XM_113468, 1845

XM_113476, 1860

XM_113531, 2526

XM_113532, 2627

XM_113540, 2548

XM_113557, 2493

XM_113564, 2846

XM_113585, 6122

XM_113615, 2927

XM_113702, 3862

XM_113712, 3635

XM_113719, 3560

XM_113726, 3584

XM_113730, 3519

XM_113737, 3855

XM_113739, 3437

XM_113752, 3946

XM_113759, 4105

XM_113823, 4163

XM_113836, 4326

XM_113840, 4608

XM_113843, 4420

XM_113845, 4418

XM_113853, 4570

XM_113855, 4560

XM_113874, 4431

XM_113876, 4426

XM_113882, 4640

XM_113892, 4978

XM_113901, 4653

XM_113919, 4905

XM_113929, 4696	XM_114497, 2058
XM_113931, 4706	XM_114555, 2429
XM_113938, 4824	XM_114578, 2444
XM_113943, 5010	XM_114602, 2404
XM_113945, 4998	XM_114613, 2625
XM_113951, 4962	XM_114617, 2517
XM_113988, 5229	XM_114618, 2523
XM_114004, 5349	XM_114640, 2556
XM_114018, 5097	XM_114646, 2756
XM_114024, 5560	XM_114649, 2873
XM_114025, 5530	XM_114655, 2854
XM_114027, 5366	XM_114661, 2677
XM_114030, 560	XM_114662, 2688
XM_114044, 129	XM_114669, 2845
XM_114055, 384	XM_114677, 2802
XM_114062, 3	XM_114678, 2801
XM_114097, 376	XM_114679, 2799
XM_114098, 360	XM_114686, 2699
XM_114109, 525	XM_114692, 6354
XM_114125, 259	XM_114708, 6291
XM_114137, 634	XM_114720, 6130
XM_114153, 484	XM_114724, 6119
XM_114154, 5875	XM_114798, 233
XM_114163, 5794	XM_114862, 3104
XM_114165, 5813	XM_114894, 2977
XM_114174, 5673	XM_114981, 3139
XM_114178, 5706	XM_115031, 3286
XM_114185, 5889	XM_115062, 3364
XM_114209, 6024	XM_115063, 3365
XM_114215, 816	XM_115081, 3177
XM_114229, 838	XM_115117, 3570
XM_114247, 824	XM_115140, 3634
XM_114266, 851	XM_115197, 3809
XM_114267, 856	XM_115215, 3948
XM_114298, 957	XM_115352, 4333
XM_114301, 1225	XM_115480, 4910
XM_114309, 1242	XM_115603, 5466
XM_114323, 1141	XM_115615, 5395
XM_114328, 1344	XM_115672, 869
XM_114356, 1288	XM_115706, 1039
XM_114364, 1122	XM_115722, 1040
XM_114368, 1510	XM_115825, 1002
XM_114401, 1496	XM_115846, 5691
XM_114424, 1473	XM_115874, 6281
XM_114426, 1470	XM_115886, 6131
XM_114434, 1555	XM_115890, 6136
XM_114435, 1552	XM_115923, 6259
XM_114437, 1567	XM_115924, 6121
XM_114439, 1586	XM_116034, 1338
XM_114440, 1587	XM_116058, 1295
XM_114442, 1584	XM_116071, 1204
XM_114453, 1819	XM_116072, 1205
XM_114457, 1817	XM_116204, 1532
XM_114469, 1623	XM_116205, 1533
XM_114482, 1683	XM_116247, 1484
XM_114492, 2106	XM_116285, 1408

XM_116307, 1691	XM_165451, 1268
XM_116340, 1807	XM_165465, 1531
XM_116365, 1856	XM_165470, 1528
XM_116427, 1648	XM_165473, 1482
XM_116439, 1593	XM_165483, 1818
XM_116447, 1606	XM_165484, 1820
XM_116465, 1716	XM_165488, 1615
XM_116511, 1857	XM_165499, 2057
XM_116514, 1861	XM_165514, 2579
XM_116524, 2140	XM_165530, 6355
XM_116806, 2789	XM_165533, 6235
XM_116818, 2738	XM_165551, 2913
XM_116853, 1139	XM_165555, 2889
XM_116856, 1810	XM_165557, 2897
XM_116863, 2975	XM_165560, 2925
XM_116913, 3845	XM_165563, 2926
XM_116926, 3451	XM_165567, 2921
XM_117061, 4913	XM_165571, 3407
XM_117066, 4768	XM_165584, 3414
XM_117096, 5084	XM_165586, 3413
XM_117118, 5379	XM_165592, 3401
XM_117122, 5183	XM_165598, 3303
XM_117128, 5605	XM_165600, 3310
XM_117159, 2	XM_165610, 3222
XM_117181, 534	XM_165611, 3217
XM_117184, 163	XM_165612, 3223
XM_117185, 582	XM_165616, 3325
XM_117196, 641	XM_165627, 3335
XM_117209, 5688	XM_165628, 3341
XM_117264, 736	XM_165631, 3328
XM_117311, 1337	XM_165636, 3903
XM_117351, 1412	XM_165639, 3917
XM_117387, 1622	XM_165645, 4534
XM_117398, 1641	XM_165647, 4528
XM_117444, 2471	XM_165648, 4537
XM_117449, 2160	XM_165649, 4527
XM_117452, 2472	XM_165656, 4484
XM_117481, 2406	XM_165657, 4493
XM_117487, 2622	XM_165658, 4489
XM_117519, 2874	XM_165669, 2091
XM_117539, 6352	XM_165692, 2159
XM_117555, 6349	XM_165698, 1949
XM_117692, 28	XM_165717, 1954
XM_118637, 4251	XM_165728, 2036
XM_165390, 3427	XM_165738, 1999
XM_165410, 4583	XM_165740, 1865
XM_165411, 4413	XM_165743, 1937
XM_165418, 4713	XM_165747, 1948
XM_165421, 4701	XM_165749, 2037
XM_165422, 4704	XM_165758, 2013
XM_165432, 5541	XM_165764, 2011
XM_165438, 144	XM_165765, 1988
XM_165439, 620	XM_165770, 1951
XM_165442, 59	XM_165771, 1983
XM_165443, 477	XM_165772, 1876
XM_165448, 723	XM_165777, 2044

191

XM_165794, 1921
XM_165799, 2006
XM_165801, 1956
XM_165809, 2016
XM_165836, 2350
XM_165839, 2346
XM_165841, 2197
XM_165860, 2167
XM_165867, 2249
XM_165870, 2245
XM_165872, 2253
XM_165876, 2258
XM_165877, 2240
XM_165882, 2248
XM_165888, 2934
XM_165890, 2929
XM_165891, 2941
XM_165903, 3633
XM_165905, 3579
XM_165906, 3532
XM_165910, 3465
XM_165921, 4127
XM_165923, 4325
XM_165954, 5026
XM_165960, 5347
XM_165963, 5367
XM_165975, 327
XM_165976, 373
XM_165977, 264
XM_165978, 532
XM_165981, 290
XM_165983, 275
XM_165984, 175
XM_165994, 927
XM_165998, 893
XM_166007, 910
XM_166008, 900
XM_166011, 1121
XM_166014, 1275
XM_166015, 1192
XM_166017, 1350
XM_166026, 1669
XM_166027, 1663
XM_166028, 1842
XM_166029, 1802
XM_166037, 1612
XM_166042, 2054
XM_166049, 2147
XM_166063, 2540
XM_166064, 2558
XM_166078, 6142
XM_166081, 6255
XM_166093, 2984
XM_166125, 2966
XM_166157, 2922
XM_166174, 3409

XM_166177, 3406
XM_166181, 3403
XM_166196, 3308
XM_166232, 3227
XM_166234, 3224
XM_166235, 3293
XM_166236, 3294
XM_166239, 3349
XM_166253, 3336
XM_166266, 3904
XM_166273, 3886
XM_166277, 4532
XM_166282, 4491
XM_166285, 4490
XM_166288, 5071
XM_166303, 2092
XM_166310, 2101
XM_166327, 2157
XM_166333, 1932
XM_166336, 2021
XM_166340, 1882
XM_166349, 1872
XM_166353, 2002
XM_166357, 2049
XM_166360, 1938
XM_166361, 2009
XM_166362, 1884
XM_166363, 1940
XM_166376, 2004
XM_166381, 1992
XM_166392, 2019
XM_166401, 1995
XM_166402, 1896
XM_166406, 2015
XM_166412, 1910
XM_166417, 1914
XM_166419, 1920
XM_166425, 1888
XM_166446, 2042
XM_166457, 1878
XM_166459, 1931
XM_166469, 1879
XM_166480, 1955
XM_166482, 2351
XM_166485, 2353
XM_166494, 2224
XM_166504, 2222
XM_166505, 2202
XM_166506, 2200
XM_166509, 2219
XM_166512, 2205
XM_166513, 2220
XM_166514, 2203
XM_166515, 2204
XM_166521, 2198
XM_166523, 2170

XM_166531, 2190
XM_166540, 2191
XM_166541, 2168
XM_166594, 2230
XM_166599, 20
XM_166605, 3506
XM_166629, 2988
XM_166665, 2918
XM_166717, 2906
XM_166743, 3418
XM_167008, 5080
XM_167016, 2087
XM_167027, 2094
XM_167037, 2096
XM_167046, 2150
XM_167128, 2023
XM_167161, 2025
XM_167169, 1868
XM_167179, 2031
XM_167196, 2041
XM_167225, 2047
XM_167339, 2264
XM_167363, 5065
XM_167366, 1209
XM_167374, 2898
XM_167395, 2963
XM_167411, 2901
XM_167414, 2904
XM_167433, 3324
XM_167437, 3192
XM_167439, 3876
XM_167453, 4538
XM_167456, 4541
XM_167476, 2321
XM_167477, 2325
XM_167483, 2328
XM_167484, 2329
XM_167494, 2273
XM_167498, 2301
XM_167500, 2299
XM_167502, 2312
XM_167504, 2300
XM_167518, 3754
XM_167530, 5529
XM_167538, 5945
XM_167558, 2645
XM_167626, 2887
XM_167716, 3244
XM_167726, 3248
XM_167747, 3234
XM_167748, 3228
XM_167780, 3417
XM_167804, 3291
XM_167853, 3318
XM_167892, 3883
XM_167906, 3877

XM_167911, 3868
XM_167918, 3869
XM_168054, 2103
XM_168070, 1928
XM_168104, 1994
XM_168123, 1877
XM_168181, 2322
XM_168251, 2323
XM_168354, 2271
XM_168378, 2269
XM_168435, 2316
XM_168450, 2315
XM_168454, 2302
XM_168461, 2311
XM_168464, 2317
XM_168470, 2310
XM_168548, 2375
XM_168572, 2380
XM_168586, 2360
XM_169414, 3880
XM_169540, 5078
XM_170195, 2267
XM_170427, 2318

Source Index (to Figure number)

gen.NM_000018,4669
gen.NM_000026,6068
gen.NM_000029,624
gen.NM_000033,6342
gen.NM_000034,4520
gen.NM_000039,3376
gen.NM_000041,5511
gen.NM_000070,4161
gen.NM_000075,3683
gen.NM_000077,2655
gen.NM_000079,898
gen.NM_000090,921
gen.NM_000107,3208
gen.NM_000114,5836
gen.NM_000121,5258
gen.NM_000126,4267
gen.NM_000137,4300
gen.NM_000143,636
gen.NM_000146,5562
gen.NM_000154,4967
gen.NM_000156,5122
gen.NM_000165,2099
gen.NM_000177,2796
gen.NM_000178,5738
gen.NM_000179,744
gen.NM_000182,713
gen.NM_000183,711
gen.NM_000184,3144
gen.NM_000196,4547
gen.NM_000213,4963
gen.NM_000221,701
gen.NM_000224,3593
gen.NM_000227,5040
gen.NM_000228,553
gen.NM_000239,3729
gen.NM_000250,4903
gen.NM_000251,741
gen.NM_000268,5994
gen.NM_000269,4889
gen.NM_000274,3076
gen.NM_000284,6138
gen.NM_000291,6230
gen.NM_000358,1671
gen.NM_000365,3460
gen.NM_000368,2806
gen.NM_000385,2262
gen.NM_000386,4843
gen.NM_000396,356
gen.NM_000404,1089
gen.NM_000407,5947
gen.NM_000422,4807
gen.NM_000425,6334
gen.NM_000447,594

gen.NM_000484,5882
gen.NM_000505,1828
gen.NM_000508,1511
gen.NM_000509,1515
gen.NM_000516,5830
gen.NM_000517,4354
gen.NM_000521,1627
gen.NM_000526,4816
gen.NM_000532,1260
gen.NM_000554,5480
gen.NM_000558,4356
gen.NM_000559,3142
gen.NM_000569,505
gen.NM_000574,558
gen.NM_000576,847
gen.NM_000582,1459
gen.NM_000592,1957
gen.NM_000598,2228
gen.NM_000602,2361
gen.NM_000612,3120
gen.NM_000638,4763
gen.NM_000661,1425
gen.NM_000666,1172
gen.NM_000687,5736
gen.NM_000688,1167
gen.NM_000700,2695
gen.NM_000701,312
gen.NM_000743,4259
gen.NM_000754,5956
gen.NM_000760,173
gen.NM_000785,3687
gen.NM_000787,2830
gen.NM_000795,3384
gen.NM_000801,5648
gen.NM_000852,3297
gen.NM_000858,612
gen.NM_000893,1327
gen.NM_000895,3763
gen.NM_000930,2534
gen.NM_000931,2536
gen.NM_000942,4218
gen.NM_000954,2868
gen.NM_000964,4820
gen.NM_000967,6061
gen.NM_000969,284
gen.NM_000970,3781
gen.NM_000971,2569
gen.NM_000972,2826
gen.NM_000973,2633
gen.NM_000975,87
gen.NM_000976,2780
gen.NM_000977,4633
gen.NM_000978,4801

gen.NM_000979,5571
gen.NM_000980,5334
gen.NM_000981,4798
gen.NM_000982,3091
gen.NM_000983,34
gen.NM_000985,5067
gen.NM_000986,1206
gen.NM_000987,4714
gen.NM_000989,2588
gen.NM_000990,3155
gen.NM_000991,5613
gen.NM_000992,1170
gen.NM_000993,832
gen.NM_000994,1064
gen.NM_000997,1570
gen.NM_000998,966
gen.NM_001000,6278
gen.NM_001002,3827
gen.NM_001003,4228
gen.NM_001005,3331
gen.NM_001006,1506
gen.NM_001007,6224
gen.NM_001009,5633
gen.NM_001010,2651
gen.NM_001011,643
gen.NM_001012,210
gen.NM_001016,2111
gen.NM_001017,3171
gen.NM_001018,5126
gen.NM_001020,5426
gen.NM_001021,4283
gen.NM_001022,5468
gen.NM_001023,2552
gen.NM_001024,5847
gen.NM_001025,1632
gen.NM_001026,2980
gen.NM_001028,3361
gen.NM_001029,3656
gen.NM_001030,440
gen.NM_001034,651
gen.NM_001038,3478
gen.NM_001043,4487
gen.NM_001050,4841
gen.NM_001064,1159
gen.NM_001065,3480
gen.NM_001068,1079
gen.NM_001069,2050
gen.NM_001084,2369
gen.NM_001087,994
gen.NM_001098,6079
gen.NM_001101,2174
gen.NM_001102,4040
gen.NM_001122,2649
gen.NM_001134,1446
gen.NM_001154,1489
gen.NM_001157,2990

gen.NM_001168,4985
gen.NM_001190,5568
gen.NM_001199,2495
gen.NM_001207,1624
gen.NM_001211,4139
gen.NM_001218,4203
gen.NM_001235,3333
gen.NM_001238,5374
gen.NM_001247,5703
gen.NM_001255,194
gen.NM_001262,229
gen.NM_001273,3468
gen.NM_001274,3411
gen.NM_001275,4065
gen.NM_001283,2365
gen.NM_001287,4372
gen.NM_001288,1969
gen.NM_001293,3337
gen.NM_001294,5508
gen.NM_001313,1396
gen.NM_001319,5141
gen.NM_001320,1971
gen.NM_001324,5814
gen.NM_001325,6239
gen.NM_001333,2736
gen.NM_001344,3984
gen.NM_001350,1942
gen.NM_001363,6318
gen.NM_001407,1132
gen.NM_001415,6143
gen.NM_001416,4687
gen.NM_001418,3163
gen.NM_001428,31
gen.NM_001436,5436
gen.NM_001444,2575
gen.NM_001450,836
gen.NM_001463,916
gen.NM_001465,1573
gen.NM_001467,3359
gen.NM_001469,6081
gen.NM_001494,2891
gen.NM_001500,2052
gen.NM_001517,1997
gen.NM_001521,689
gen.NM_001530,4016
gen.NM_001536,5539
gen.NM_001539,2660
gen.NM_001540,2308
gen.NM_001553,1435
gen.NM_001554,269
gen.NM_001560,6270
gen.NM_001567,3322
gen.NM_001568,2596
gen.NM_001569,6332
gen.NM_001571,5542
gen.NM_001605,4564

gen.NM_001607,1097
gen.NM_001610,3206
gen.NM_001613,3008
gen.NM_001622,1330
gen.NM_001628,2423
gen.NM_001641,3997
gen.NM_001644,3511
gen.NM_001647,1352
gen.NM_001648,5590
gen.NM_001659,3550
gen.NM_001662,2398
gen.NM_001667,3284
gen.NM_001673,2355
gen.NM_001687,5115
gen.NM_001688,308
gen.NM_001696,5941
gen.NM_001697,5892
gen.NM_001710,1959
gen.NM_001734,3452
gen.NM_001743,5494
gen.NM_001747,806
gen.NM_001751,3137
gen.NM_001753,2391
gen.NM_001757,5894
gen.NM_001760,1898
gen.NM_001762,2274
gen.NM_001780,3663
gen.NM_001791,81
gen.NM_001816,5478
gen.NM_001819,5679
gen.NM_001827,2714
gen.NM_001831,2506
gen.NM_001833,2689
gen.NM_001842,2668
gen.NM_001853,5853
gen.NM_001861,4614
gen.NM_001862,827
gen.NM_001878,392
gen.NM_001907,4579
gen.NM_001909,3133
gen.NM_001920,3740
gen.NM_001930,5267
gen.NM_001935,894
gen.NM_001944,5050
gen.NM_001959,950
gen.NM_001961,5178
gen.NM_001964,1689
gen.NM_001969,4098
gen.NM_001970,4697
gen.NM_001975,3458
gen.NM_001983,5502
gen.NM_001985,5593
gen.NM_002003,2834
gen.NM_002004,422
gen.NM_002011,1836
gen.NM_002014,3439

gen.NM_002015,3896
gen.NM_002018,4719
gen.NM_002028,4010
gen.NM_002046,3473
gen.NM_002047,2265
gen.NM_002075,3463
gen.NM_002079,3066
gen.NM_002083,4012
gen.NM_002084,1704
gen.NM_002085,5112
gen.NM_002086,4953
gen.NM_002087,4845
gen.NM_002106,1478
gen.NM_002109,1779
gen.NM_002128,3887
gen.NM_002129,1522
gen.NM_002130,1582
gen.NM_002133,6020
gen.NM_002137,2210
gen.NM_002157,930
gen.NM_002161,2716
gen.NM_002168,4293
gen.NM_002178,3600
gen.NM_002211,2919
gen.NM_002212,5742
gen.NM_002229,5272
gen.NM_002265,4834
gen.NM_002273,3591
gen.NM_002274,4814
gen.NM_002275,4812
gen.NM_002276,4810
gen.NM_002295,1108
gen.NM_002305,6038
gen.NM_002306,4022
gen.NM_002339,3115
gen.NM_002340,5931
gen.NM_002342,3476
gen.NM_002345,3752
gen.NM_002355,3489
gen.NM_002358,1485
gen.NM_002364,6147
gen.NM_002385,5086
gen.NM_002386,4626
gen.NM_002388,1866
gen.NM_002396,5069
gen.NM_002397,1646
gen.NM_002401,4933
gen.NM_002411,3245
gen.NM_002413,1494
gen.NM_002414,6124
gen.NM_002415,5979
gen.NM_002453,751
gen.NM_002466,5774
gen.NM_002468,1095
gen.NM_002473,6025
gen.NM_002477,1368

gen.NM_002484,4416
gen.NM_002486,2734
gen.NM_002489,2193
gen.NM_002492,1297
gen.NM_002512,4887
gen.NM_002520,1803
gen.NM_002537,4210
gen.NM_002539,659
gen.NM_002567,3816
gen.NM_002568,2593
gen.NM_002574,220
gen.NM_002588,1728
gen.NM_002606,5900
gen.NM_002615,4647
gen.NM_002617,12
gen.NM_002632,4052
gen.NM_002634,4939
gen.NM_002638,5779
gen.NM_002654,4242
gen.NM_002660,5771
gen.NM_002668,6185
gen.NM_002689,3289
gen.NM_002691,5580
gen.NM_002707,681
gen.NM_002712,1030
gen.NM_002720,4518
gen.NM_002727,2961
gen.NM_002730,5298
gen.NM_002733,3555
gen.NM_002766,4975
gen.NM_002787,2254
gen.NM_002789,4261
gen.NM_002792,5838
gen.NM_002793,2137
gen.NM_002796,346
gen.NM_002802,4059
gen.NM_002803,2378
gen.NM_002809,4805
gen.NM_002810,348
gen.NM_002812,5401
gen.NM_002813,3837
gen.NM_002815,4778
gen.NM_002819,5102
gen.NM_002827,5809
gen.NM_002846,980
gen.NM_002854,1188
gen.NM_002856,5515
gen.NM_002857,481
gen.NM_002863,4029
gen.NM_002870,438
gen.NM_002878,4784
gen.NM_002883,6075
gen.NM_002887,1800
gen.NM_002913,1427
gen.NM_002915,3891
gen.NM_002921,3002

gen.NM_002923,540
gen.NM_002934,3992
gen.NM_002938,1386
gen.NM_002946,127
gen.NM_002947,2188
gen.NM_002948,1076
gen.NM_002952,4382
gen.NM_002954,749
gen.NM_002961,369
gen.NM_002965,364
gen.NM_002979,235
gen.NM_003002,3390
gen.NM_003021,5161
gen.NM_003025,5188
gen.NM_003055,2947
gen.NM_003064,5781
gen.NM_003072,5254
gen.NM_003076,3568
gen.NM_003088,2176
gen.NM_003090,4320
gen.NM_003091,5654
gen.NM_003092,5683
gen.NM_003104,4187
gen.NM_003107,2032
gen.NM_003123,4511
gen.NM_003124,789
gen.NM_003128,746
gen.NM_003132,50
gen.NM_003137,1916
gen.NM_003143,2435
gen.NM_003145,409
gen.NM_003146,3215
gen.NM_003149,1099
gen.NM_003169,5428
gen.NM_003181,2135
gen.NM_003216,6077
gen.NM_003283,5608
gen.NM_003287,2104
gen.NM_003289,2680
gen.NM_003290,5312
gen.NM_003295,3900
gen.NM_003310,649
gen.NM_003316,5896
gen.NM_003334,6167
gen.NM_003349,5804
gen.NM_003350,2546
gen.NM_003365,1134
gen.NM_003366,4421
gen.NM_003370,5499
gen.NM_003374,1677
gen.NM_003375,2982
gen.NM_003378,2367
gen.NM_003389,2728
gen.NM_003400,761
gen.NM_003401,1636
gen.NM_003406,2590

gen.NM_003418,1250
gen.NM_003453,3864
gen.NM_003461,2440
gen.NM_003472,2034
gen.NM_003516,459
gen.NM_003564,474
gen.NM_003598,5556
gen.NM_003617,497
gen.NM_003624,5214
gen.NM_003626,3316
gen.NM_003646,3197
gen.NM_003662,6149
gen.NM_003680,157
gen.NM_003681,5905
gen.NM_003685,5203
gen.NM_003687,1673
gen.NM_003689,71
gen.NM_003712,5093
gen.NM_003714,1812
gen.NM_003720,5898
gen.NM_003721,5360
gen.NM_003722,1335
gen.NM_003729,288
gen.NM_003735,1730
gen.NM_003736,1732
gen.NM_003739,2883
gen.NM_003752,4449
gen.NM_003753,6027
gen.NM_003755,5234
gen.NM_003756,2598
gen.NM_003757,148
gen.NM_003765,5288
gen.NM_003766,4865
gen.NM_003779,468
gen.NM_003780,199
gen.NM_003787,5052
gen.NM_003815,457
gen.NM_003824,3313
gen.NM_003836,4088
gen.NM_003837,2723
gen.NM_003859,5811
gen.NM_003876,4708
gen.NM_003877,3757
gen.NM_003906,5933
gen.NM_003908,5734
gen.NM_003915,5747
gen.NM_003932,6070
gen.NM_003937,881
gen.NM_003938,5148
gen.NM_003971,4891
gen.NM_003973,1110
gen.NM_003979,3498
gen.NM_004000,306
gen.NM_004004,3866
gen.NM_004044,955
gen.NM_004048,4178

gen.NM_004053,1900
gen.NM_004060,1791
gen.NM_004074,3264
gen.NM_004084,2476
gen.NM_004085,6242
gen.NM_004092,3099
gen.NM_004111,3253
gen.NM_004117,1918
gen.NM_004127,5008
gen.NM_004134,1693
gen.NM_004135,6340
gen.NM_004147,6011
gen.NM_004152,5154
gen.NM_004159,1952
gen.NM_004175,5983
gen.NM_004176,4742
gen.NM_004178,3614
gen.NM_004181,1430
gen.NM_004182,6174
gen.NM_004193,3045
gen.NM_004203,4402
gen.NM_004208,6285
gen.NM_004217,4699
gen.NM_004219,1795
gen.NM_004240,5206
gen.NM_004247,4879
gen.NM_004261,273
gen.NM_004265,3249
gen.NM_004309,5002
gen.NM_004322,3256
gen.NM_004323,2662
gen.NM_004324,5564
gen.NM_004335,5328
gen.NM_004339,5921
gen.NM_004341,692
gen.NM_004345,1128
gen.NM_004360,4549
gen.NM_004398,3392
gen.NM_004401,48
gen.NM_004404,1034
gen.NM_004435,2761
gen.NM_004448,4796
gen.NM_004461,5279
gen.NM_004483,4602
gen.NM_004493,6190
gen.NM_004509,1012
gen.NM_004510,1014
gen.NM_004524,4960
gen.NM_004539,5072
gen.NM_004547,1218
gen.NM_004550,470
gen.NM_004551,3199
gen.NM_004555,4586
gen.NM_004573,4141
gen.NM_004595,6140
gen.NM_004596,5448

gen.NM_004599,6085
gen.NM_004618,4716
gen.NM_004632,414
gen.NM_004635,1155
gen.NM_004636,1149
gen.NM_004637,1246
gen.NM_004638,1979
gen.NM_004639,1973
gen.NM_004640,1986
gen.NM_004673,529
gen.NM_004691,4545
gen.NM_004697,2751
gen.NM_004699,6323
gen.NM_004701,4197
gen.NM_004704,1182
gen.NM_004706,5470
gen.NM_004714,5434
gen.NM_004725,3093
gen.NM_004728,2959
gen.NM_004735,1026
gen.NM_004738,5824
gen.NM_004739,3230
gen.NM_004766,1270
gen.NM_004767,576
gen.NM_004772,1650
gen.NM_004781,44
gen.NM_004794,6287
gen.NM_004813,3190
gen.NM_004821,1787
gen.NM_004844,1066
gen.NM_004846,998
gen.NM_004859,4921
gen.NM_004870,4689
gen.NM_004889,2342
gen.NM_004893,1685
gen.NM_004905,511
gen.NM_004911,2442
gen.NM_004928,5915
gen.NM_004930,69
gen.NM_004933,4638
gen.NM_004939,662
gen.NM_004957,2775
gen.NM_004960,4465
gen.NM_004964,150
gen.NM_004973,2039
gen.NM_004982,3526
gen.NM_004990,3669
gen.NM_004992,6330
gen.NM_004994,5791
gen.NM_004995,3976
gen.NM_005000,2396
gen.NM_005002,3448
gen.NM_005003,4446
gen.NM_005004,3063
gen.NM_005005,2606
gen.NM_005008,6083

gen.NM_005015,3981
gen.NM_005016,3620
gen.NM_005022,4665
gen.NM_005030,4442
gen.NM_005036,6104
gen.NM_005042,3524
gen.NM_005053,5283
gen.NM_005072,4581
gen.NM_005080,5987
gen.NM_005109,1093
gen.NM_005110,1854
gen.NM_005112,1421
gen.NM_005115,4500
gen.NM_005132,3962
gen.NM_005141,1508
gen.NM_005163,4110
gen.NM_005171,3574
gen.NM_005174,2895
gen.NM_005194,5808
gen.NM_005217,2478
gen.NM_005220,4946
gen.NM_005224,5104
gen.NM_005243,5989
gen.NM_005269,3667
gen.NM_005271,3004
gen.NM_005291,854
gen.NM_005300,6159
gen.NM_005313,4174
gen.NM_005324,4969
gen.NM_005330,3146
gen.NM_005333,6126
gen.NM_005345,1963
gen.NM_005346,1961
gen.NM_005347,2790
gen.NM_005348,4092
gen.NM_005362,6316
gen.NM_005364,6308
gen.NM_005370,5314
gen.NM_005371,3689
gen.NM_005378,657
gen.NM_005389,2126
gen.NM_005432,4101
gen.NM_005439,3466
gen.NM_005440,4877
gen.NM_005452,1944
gen.NM_005474,4850
gen.NM_005490,5208
gen.NM_005498,5241
gen.NM_005514,2155
gen.NM_005517,110
gen.NM_005520,1850
gen.NM_005548,4568
gen.NM_005563,105
gen.NM_005566,3175
gen.NM_005572,404
gen.NM_005573,1718

199

gen.NM_005581,5517
gen.NM_005594,3628
gen.NM_005614,2460
gen.NM_005617,1708
gen.NM_005620,340
gen.NM_005623,4782
gen.NM_005632,4362
gen.NM_005657,4170
gen.NM_005663,1382
gen.NM_005676,6165
gen.NM_005686,550
gen.NM_005692,2458
gen.NM_005693,3204
gen.NM_005698,424
gen.NM_005710,6181
gen.NM_005713,1602
gen.NM_005717,517
gen.NM_005718,1055
gen.NM_005720,2348
gen.NM_005724,4273
gen.NM_005726,3695
gen.NM_005729,2986
gen.NM_005731,996
gen.NM_005745,6344
gen.NM_005754,1697
gen.NM_005762,5627
gen.NM_005770,4176
gen.NM_005775,2491
gen.NM_005783,829
gen.NM_005787,1316
gen.NM_005796,4575
gen.NM_005806,5887
gen.NM_005826,83
gen.NM_005830,3898
gen.NM_005831,4911
gen.NM_005833,2792
gen.NM_005837,2326
gen.NM_005850,461
gen.NM_005851,3301
gen.NM_005855,1024
gen.NM_005866,2670
gen.NM_005877,5999
gen.NM_005884,5421
gen.NM_005889,3509
gen.NM_005911,808
gen.NM_005915,864
gen.NM_005917,764
gen.NM_005918,2306
gen.NM_005973,389
gen.NM_005981,3681
gen.NM_005983,1579
gen.NM_005985,5802
gen.NM_005997,350
gen.NM_006000,982
gen.NM_006012,5201
gen.NM_006013,6326

gen.NM_006019,3304
gen.NM_006023,2899
gen.NM_006039,4936
gen.NM_006053,3306
gen.NM_006058,1702
gen.NM_006066,218
gen.NM_006067,4612
gen.NM_006098,1852
gen.NM_006101,5023
gen.NM_006109,3973
gen.NM_006110,4423
gen.NM_006112,159
gen.NM_006114,5513
gen.NM_006115,5975
gen.NM_006128,2497
gen.NM_006131,2499
gen.NM_006132,2501
gen.NM_006136,2393
gen.NM_006169,3380
gen.NM_006184,5566
gen.NM_006227,5789
gen.NM_006230,2246
gen.NM_006245,1892
gen.NM_006247,5497
gen.NM_006250,3522
gen.NM_006253,3831
gen.NM_006262,3546
gen.NM_006265,2600
gen.NM_006271,374
gen.NM_006272,5935
gen.NM_006280,6338
gen.NM_006289,2682
gen.NM_006295,1967
gen.NM_006303,2178
gen.NM_006330,2550
gen.NM_006335,571
gen.NM_006339,5171
gen.NM_006342,1374
gen.NM_006349,2371
gen.NM_006354,1049
gen.NM_006362,3242
gen.NM_006365,396
gen.NM_006373,4875
gen.NM_006384,4305
gen.NM_006387,5319
gen.NM_006395,1062
gen.NM_006397,5277
gen.NM_006401,2732
gen.NM_006427,4106
gen.NM_006428,4360
gen.NM_006429,792
gen.NM_006430,759
gen.NM_006432,4048
gen.NM_006435,3113
gen.NM_006439,1504
gen.NM_006440,5954

gen.NM_006453,4384
gen.NM_006455,4822
gen.NM_006470,4725
gen.NM_006478,5991
gen.NM_006488,703
gen.NM_006494,5476
gen.NM_006503,5441
gen.NM_006513,298
gen.NM_006516,188
gen.NM_006523,3055
gen.NM_006530,3727
gen.NM_006556,452
gen.NM_006559,146
gen.NM_006576,3697
gen.NM_006585,5885
gen.NM_006586,1894
gen.NM_006589,428
gen.NM_006600,118
gen.NM_006601,3636
gen.NM_006621,300
gen.NM_006625,93
gen.NM_006636,794
gen.NM_006646,3881
gen.NM_006659,3101
gen.NM_006666,5558
gen.NM_006667,6272
gen.NM_006670,2070
gen.NM_006693,2344
gen.NM_006694,436
gen.NM_006698,5760
gen.NM_006708,1904
gen.NM_006711,4392
gen.NM_006746,6134
gen.NM_006761,4642
gen.NM_006763,548
gen.NM_006764,1151
gen.NM_006769,271
gen.NM_006787,6197
gen.NM_006791,4279
gen.NM_006799,4408
gen.NM_006801,5576
gen.NM_006805,1687
gen.NM_006808,2740
gen.NM_006810,1223
gen.NM_006812,3678
gen.NM_006815,3847
gen.NM_006816,1830
gen.NM_006817,3785
gen.NM_006821,4046
gen.NM_006824,192
gen.NM_006825,3807
gen.NM_006826,655
gen.NM_006833,2338
gen.NM_006835,1449
gen.NM_006837,2565
gen.NM_006839,814

gen.NM_006842,3295
gen.NM_006844,5308
gen.NM_006854,2184
gen.NM_006862,344
gen.NM_006888,4063
gen.NM_006899,5661
gen.NM_006908,2182
gen.NM_006924,4908
gen.NM_006928,3660
gen.NM_006932,6007
gen.NM_006938,5039
gen.NM_006941,6049
gen.NM_006942,4691
gen.NM_006990,124
gen.NM_007002,5844
gen.NM_007019,5785
gen.NM_007032,6040
gen.NM_007034,267
gen.NM_007046,705
gen.NM_007047,2029
gen.NM_007062,3805
gen.NM_007065,5237
gen.NM_007074,4516
gen.NM_007085,1216
gen.NM_007096,2691
gen.NM_007100,1366
gen.NM_007103,3299
gen.NM_007104,1922
gen.NM_007158,302
gen.NM_007165,5152
gen.NM_007173,3348
gen.NM_007178,3501
gen.NM_007184,1165
gen.NM_007186,5744
gen.NM_007190,3089
gen.NM_007209,2794
gen.NM_007242,4566
gen.NM_007244,3520
gen.NM_007260,89
gen.NM_007262,42
gen.NM_007263,5352
gen.NM_007268,6204
gen.NM_007273,3455
gen.NM_007275,1153
gen.NM_007276,2214
gen.NM_007279,5619
gen.NM_007310,5958
gen.NM_007311,6095
gen.NM_007317,4507
gen.NM_007355,1874
gen.NM_007364,4277
gen.NM_007372,4931
gen.NM_012068,5525
gen.NM_012098,2782
gen.NM_012099,5504
gen.NM_012100,977

gen.NM_012101,3420
gen.NM_012111,4055
gen.NM_012112,5715
gen.NM_012116,5519
gen.NM_012138,4838
gen.NM_012170,4265
gen.NM_012179,6017
gen.NM_012181,5350
gen.NM_012203,2693
gen.NM_012207,2955
gen.NM_012237,5409
gen.NM_012248,4451
gen.NM_012255,5698
gen.NM_012264,6054
gen.NM_012286,6246
gen.NM_012296,3344
gen.NM_012323,6052
gen.NM_012391,1929
gen.NM_012412,2236
gen.NM_012423,5550
gen.NM_012437,381
gen.NM_012458,5155
gen.NM_012469,5873
gen.NM_012486,596
gen.NM_013237,1834
gen.NM_013247,801
gen.NM_013265,3279
gen.NM_013274,3037
gen.NM_013277,3566
gen.NM_013296,292
gen.NM_013333,5617
gen.NM_013336,1238
gen.NM_013341,903
gen.NM_013363,1276
gen.NM_013365,6032
gen.NM_013369,5911
gen.NM_013375,2027
gen.NM_013393,2165
gen.NM_013402,3251
gen.NM_013403,5492
gen.NM_013406,5269
gen.NM_013407,5270
gen.NM_013417,2718
gen.NM_013442,2675
gen.NM_013451,3013
gen.NM_014003,4592
gen.NM_014008,6187
gen.NM_014033,3576
gen.NM_014035,1664
gen.NM_014042,3320
gen.NM_014062,4556
gen.NM_014063,2251
gen.NM_014107,2077
gen.NM_014138,6163
gen.NM_014166,3906
gen.NM_014172,2862

gen.NM_014173,5326
gen.NM_014176,578
gen.NM_014184,585
gen.NM_014188,17
gen.NM_014189,1390
gen.NM_014190,1388
gen.NM_014203,5536
gen.NM_014214,5032
gen.NM_014226,4095
gen.NM_014236,626
gen.NM_014248,6072
gen.NM_014255,3631
gen.NM_014267,3173
gen.NM_014275,1846
gen.NM_014285,2820
gen.NM_014294,2567
gen.NM_014303,6003
gen.NM_014306,6015
gen.NM_014311,3606
gen.NM_014320,2116
gen.NM_014321,4476
gen.NM_014325,3777
gen.NM_014335,4182
gen.NM_014341,1906
gen.NM_014353,4386
gen.NM_014408,167
gen.NM_014413,2180
gen.NM_014426,5685
gen.NM_014444,4168
gen.NM_014445,1284
gen.NM_014452,1870
gen.NM_014453,5625
gen.NM_014481,6199
gen.NM_014501,5615
gen.NM_014502,3220
gen.NM_014515,3724
gen.NM_014556,1394
gen.NM_014571,142
gen.NM_014585,923
gen.NM_014587,4370
gen.NM_014610,3232
gen.NM_014624,367
gen.NM_014649,5199
gen.NM_014663,202
gen.NM_014670,934
gen.NM_014685,4530
gen.NM_014713,667
gen.NM_014736,4214
gen.NM_014737,5676
gen.NM_014742,5721
gen.NM_014747,180
gen.NM_014748,684
gen.NM_014752,3329
gen.NM_014773,1721
gen.NM_014776,3792
gen.NM_014778,3878

202

gen.NM_014800,2259
gen.NM_014814,1195
gen.NM_014829,1681
gen.NM_014837,519
gen.NM_014847,446
gen.NM_014849,463
gen.NM_014851,36
gen.NM_014868,3823
gen.NM_014887,3889
gen.NM_014919,1378
gen.NM_014931,5610
gen.NM_014933,1457
gen.NM_014941,6005
gen.NM_014972,4628
gen.NM_015043,1843
gen.NM_015062,3042
gen.NM_015064,3430
gen.NM_015068,2319
gen.NM_015129,6276
gen.NM_015140,6097
gen.NM_015179,3024
gen.NM_015322,4226
gen.NM_015324,3149
gen.NM_015373,6056
gen.NM_015388,1886
gen.NM_015438,3470
gen.NM_015449,444
gen.NM_015453,1043
gen.NM_015472,1282
gen.NM_015484,99
gen.NM_015511,5752
gen.NM_015533,3225
gen.NM_015544,4780
gen.NM_015584,4761
gen.NM_015629,5600
gen.NM_015636,686
gen.NM_015640,260
gen.NM_015644,1057
gen.NM_015646,3720
gen.NM_015665,3604
gen.NM_015702,885
gen.NM_015714,555
gen.NM_015853,3238
gen.NM_015920,4205
gen.NM_015932,3884
gen.NM_015934,941
gen.NM_015937,5783
gen.NM_015953,5546
gen.NM_015965,5362
gen.NM_015966,5745
gen.NM_016003,2172
gen.NM_016016,4847
gen.NM_016022,334
gen.NM_016026,4037
gen.NM_016030,647
gen.NM_016059,1908

gen.NM_016085,694
gen.NM_016091,6045
gen.NM_016095,4610
gen.NM_016111,4374
gen.NM_016119,3912
gen.NM_016143,5652
gen.NM_016169,3051
gen.NM_016174,2767
gen.NM_016176,26
gen.NM_016183,73
gen.NM_016202,5621
gen.NM_016223,3210
gen.NM_016249,6300
gen.NM_016263,5169
gen.NM_016267,6293
gen.NM_016286,5006
gen.NM_016292,4414
gen.NM_016304,4193
gen.NM_016328,2293
gen.NM_016357,3572
gen.NM_016359,4152
gen.NM_016361,328
gen.NM_016410,2664
gen.NM_016440,5523
gen.NM_016445,4035
gen.NM_016456,564
gen.NM_016498,6001
gen.NM_016526,3107
gen.NM_016539,5181
gen.NM_016558,5750
gen.NM_016567,3097
gen.NM_016579,5216
gen.NM_016587,2216
gen.NM_016592,5826
gen.NM_016638,3843
gen.NM_016639,4398
gen.NM_016641,4335
gen.NM_016645,4302
gen.NM_016647,2614
gen.NM_016732,5733
gen.NM_016838,887
gen.NM_016839,889
gen.NM_016930,1400
gen.NM_016940,5883
gen.NM_016941,5432
gen.NM_017443,2753
gen.NM_017458,4498
gen.NM_017491,1419
gen.NM_017546,834
gen.NM_017566,4617
gen.NM_017572,5146
gen.NM_017595,4871
gen.NM_017601,1902
gen.NM_017610,4195
gen.NM_017613,5890
gen.NM_017647,4929

gen.NM_017668,4327

gen.NM_017670,3266

gen.NM_017684,4208

gen.NM_017722,5286

gen.NM_017751,859

gen.NM_017760,2467

gen.NM_017761,91

gen.NM_017768,262

gen.NM_017777,4906

gen.NM_017789,825

gen.NM_017797,5143

gen.NM_017801,1081

gen.NM_017803,4584

gen.NM_017807,4003

gen.NM_017815,3971

gen.NM_017822,3552

gen.NM_017825,165

gen.NM_017827,5413

gen.NM_017829,5939

gen.NM_017847,513

gen.NM_017853,4594

gen.NM_017868,3386

gen.NM_017874,5668

gen.NM_017876,5098

gen.NM_017882,4224

gen.NM_017883,6179

gen.NM_017891,8

gen.NM_017895,5798

gen.NM_017900,22

gen.NM_017901,3810

gen.NM_017910,674

gen.NM_017916,5554

gen.NM_017952,812

gen.NM_017955,4112

gen.NM_017974,1020

gen.NM_018019,4737

gen.NM_018023,1306

gen.NM_018032,4358

gen.NM_018034,1575

gen.NM_018035,5458

gen.NM_018047,1706

gen.NM_018048,3517

gen.NM_018054,4436

gen.NM_018066,116

gen.NM_018070,239

gen.NM_018085,569

gen.NM_018096,4792

gen.NM_018110,4535

gen.NM_018113,3548

gen.NM_018116,420

gen.NM_018122,535

gen.NM_018124,4588

gen.NM_018135,1880

gen.NM_018154,5300

gen.NM_018174,5332

gen.NM_018188,10

gen.NM_018209,5861

gen.NM_018212,587

gen.NM_018217,5740

gen.NM_018238,2437

gen.NM_018242,4747

gen.NM_018250,2510

gen.NM_018253,418

gen.NM_018255,5056

gen.NM_018270,5849

gen.NM_018310,2527

gen.NM_018346,4898

gen.NM_018357,4232

gen.NM_018410,1018

gen.NM_018454,4154

gen.NM_018457,3610

gen.NM_018463,3442

gen.NM_018464,2951

gen.NM_018468,5387

gen.NM_018486,6222

gen.NM_018509,4900

gen.NM_018607,721

gen.NM_018660,2512

gen.NM_018668,4312

gen.NM_018674,973

gen.NM_018686,3513

gen.NM_018912,1734

gen.NM_018913,1736

gen.NM_018914,1738

gen.NM_018915,1740

gen.NM_018916,1742

gen.NM_018917,1744

gen.NM_018918,1746

gen.NM_018919,1748

gen.NM_018920,1750

gen.NM_018921,1752

gen.NM_018922,1754

gen.NM_018923,1756

gen.NM_018924,1758

gen.NM_018925,1760

gen.NM_018926,1762

gen.NM_018927,1764

gen.NM_018928,1766

gen.NM_018929,1768

gen.NM_018947,2208

gen.NM_018948,41

gen.NM_018950,2017

gen.NM_018955,4728

gen.NM_018957,6034

gen.NM_018977,6214

gen.NM_019013,4682

gen.NM_019058,2971

gen.NM_019059,2206

gen.NM_019082,2242

gen.NM_019095,5681

gen.NM_019099,310

gen.NM_019554,371

gen.NM_019606,2333
gen.NM_019609,5663
gen.NM_019619,2916
gen.NM_019848,6321
gen.NM_019852,3988
gen.NM_019887,3839
gen.NM_020037,4895
gen.NM_020038,4893
gen.NM_020132,5908
gen.NM_020134,709
gen.NM_020149,4136
gen.NM_020158,5454
gen.NM_020188,4604
gen.NM_020230,5232
gen.NM_020243,6058
gen.NM_020299,2425
gen.NM_020315,6036
gen.NM_020320,2075
gen.NM_020347,1113
gen.NM_020401,3717
gen.NM_020414,4069
gen.NM_020418,1180
gen.NM_020548,871
gen.NM_020675,896
gen.NM_020677,4340
gen.NM_020701,1248
gen.NM_020990,4172
gen.NM_020992,3017
gen.NM_021019,3646
gen.NM_021029,6244
gen.NM_021079,4883
gen.NM_021095,698
gen.NM_021103,803
gen.NM_021104,3654
gen.NM_021107,5415
gen.NM_021121,948
gen.NM_021126,6029
gen.NM_021129,2964
gen.NM_021130,2238
gen.NM_021141,958
gen.NM_021154,2701
gen.NM_021158,5638
gen.NM_021177,1965
gen.NM_021178,4006
gen.NM_021195,4400
gen.NM_021213,4919
gen.NM_021219,5879
gen.NM_021226,2945
gen.NM_021626,4917
gen.NM_021709,4108
gen.NM_021728,4020
gen.NM_021826,5665
gen.NM_021830,3033
gen.NM_021831,707
gen.NM_021870,1517
gen.NM_021871,1513

gen.NM_021932,3109
gen.NM_021934,3588
gen.NM_021948,394
gen.NM_021953,3444
gen.NM_021966,4079
gen.NM_021999,3908
gen.NM_022003,3369
gen.NM_022039,3039
gen.NM_022044,5973
gen.NM_022048,4216
gen.NM_022105,5857
gen.NM_022137,4042
gen.NM_022141,6101
gen.NM_022158,5016
gen.NM_022170,2288
gen.NM_022171,1145
gen.NM_022362,3029
gen.NM_022369,4246
gen.NM_022371,527
gen.NM_022442,5806
gen.NM_022453,988
gen.NM_022458,2464
gen.NM_022461,1086
gen.NM_022485,1045
gen.NM_022550,1638
gen.NM_022551,1946
gen.NM_022552,717
gen.NM_022566,4296
gen.NM_022727,5961
gen.NM_022744,4468
gen.NM_022747,4084
gen.NM_022748,2226
gen.NM_022752,5474
gen.NM_022758,1926
gen.NM_022770,4539
gen.NM_022778,107
gen.NM_022839,4290
gen.NM_022963,1838
gen.NM_023009,152
gen.NM_023011,3940
gen.NM_023032,3691
gen.NM_023033,3693
gen.NM_023078,2620
gen.NM_023936,4378
gen.NM_023942,2449
gen.NM_024003,6336
gen.NM_024026,3872
gen.NM_024027,645
gen.NM_024029,5250
gen.NM_024031,4458
gen.NM_024033,2427
gen.NM_024040,3047
gen.NM_024045,2957
gen.NM_024048,4470
gen.NM_024067,2186
gen.NM_024068,3643

gen.NM_024070,2335
gen.NM_024089,3935
gen.NM_024098,3218
gen.NM_024099,3236
gen.NM_024104,5323
gen.NM_024111,4148
gen.NM_024294,1924
gen.NM_024297,4672
gen.NM_024299,5865
gen.NM_024319,614
gen.NM_024321,5389
gen.NM_024329,62
gen.NM_024330,379
gen.NM_024333,5186
gen.NM_024339,4396
gen.NM_024407,5120
gen.NM_024507,4406
gen.NM_024516,4502
gen.NM_024537,3938
gen.NM_024567,2508
gen.NM_024571,4350
gen.NM_024572,719
gen.NM_024586,247
gen.NM_024589,4346
gen.NM_024602,206
gen.NM_024603,241
gen.NM_024613,2584
gen.NM_024627,5951
gen.NM_024640,137
gen.NM_024653,2373
gen.NM_024658,3960
gen.NM_024664,183
gen.NM_024668,1724
gen.NM_024671,4454
gen.NM_024691,5636
gen.NM_024709,603
gen.NM_024748,1526]
gen.NM_024824,4057
gen.NM_024844,4955
gen.NM_024854,3529
gen.NM_024855,5769
gen.NM_024863,6248
gen.NM_024881,5321
gen.NM_024900,1491
gen.NM_024918,5757
gen.NM_024942,3095
gen.NM_025070,2541
gen.NM_025072,2772
gen.NM_025108,4411
gen.NM_025129,5534
gen.NM_025150,358
gen.NM_025164,3374
gen.NM_025168,1863
gen.NM_025197,4830
gen.NM_025202,1000
gen.NM_025203,678

gen.NM_025204,6109
gen.NM_025205,1414
gen.NM_025207,455
gen.NM_025226,499
gen.NM_025232,2503
gen.NM_025233,4859
gen.NM_025234,4270
gen.NM_025241,5190
gen.NM_025263,2007
gen.NM_030567,1826
gen.NM_030573,5965
gen.NM_030579,4553
gen.NM_030587,196
gen.NM_030593,5411
gen.NM_030775,3432
gen.NM_030782,1545
gen.NM_030815,5719
gen.NM_030819,4573
gen.NM_030877,5763
gen.NM_030900,2232
gen.NM_030920,332
gen.NM_030921,1272
gen.NM_030925,3910
gen.NM_030926,1009
gen.NM_030935,2331
gen.NM_030973,5532
gen.NM_031157,3612
gen.NM_031206,6210
gen.NM_031213,5138
gen.NM_031228,5642
gen.NM_031229,5640
gen.NM_031243,2212
gen.NM_031263,2708
gen.NM_031289,3496
gen.NM_031300,1832
gen.NM_031417,5506
gen.NM_031434,2456
gen.NM_031443,2234
gen.NM_031453,2902
gen.NM_031459,131
gen.NM_031465,3446
gen.NM_031472,3261
gen.NM_031478,4522
gen.NM_031479,3665
gen.NM_031482,1629
gen.NM_031484,3070
gen.NM_031485,5574
gen.NM_031901,336
gen.NM_031925,2304
gen.NM_031942,905
gen.NM_031966,1598
gen.NM_031968,5014
gen.NM_031989,3622
gen.NM_031990,5100
gen.NM_031992,2290
gen.NM_032023,2923

gen.NM_032038,4495
gen.NM_032088,1770
gen.NM_032092,1772
gen.NM_032112,3031
gen.NM_032140,4571
gen.NM_032162,4310
gen.NM_032164,2340
gen.NM_032196,4150
gen.NM_032204,5996
gen.NM_032207,5317
gen.NM_032211,3068
gen.NM_032212,843
gen.NM_032219,1370
gen.NM_032227,6257
gen.NM_032271,4388
gen.NM_032280,1642
gen.NM_032288,1354
gen.NM_032292,412
gen.NM_032299,3395
gen.NM_032313,1437
gen.NM_032322,4771
gen.NM_032323,402
gen.NM_032324,630
gen.NM_032330,4485
gen.NM_032331,1318
gen.NM_032333,2996
gen.NM_032338,3712
gen.NM_032342,2746
gen.NM_032343,1235
gen.NM_032350,2163
gen.NM_032361,1814
gen.NM_032376,4854
gen.NM_032377,5262
gen.NM_032379,3346
gen.NM_032383,1280
gen.NM_032390,875
gen.NM_032402,1776
gen.NM_032403,1774
gen.NM_032486,4444
gen.NM_032527,5869
gen.NM_032565,3914
gen.NM_032626,4440
gen.NM_032627,5345
gen.NM_032635,5393
gen.NM_032636,296
gen.NM_032637,1577
gen.NM_032642,3434
gen.NM_032656,3851
gen.NM_032667,3240
gen.NM_032712,5588
gen.NM_032726,990
gen.NM_032737,5157
gen.NM_032738,503
gen.NM_032747,3061
gen.NM_032750,1174
gen.NM_032753,5173

gen.NM_032756,222
gen.NM_032792,5631
gen.NM_032799,2763
gen.NM_032814,3812
gen.NM_032822,785
gen.NM_032827,810
gen.NM_032864,245
gen.NM_032871,3326
gen.NM_032872,122
gen.NM_032873,3415
gen.NM_032890,606
gen.NM_032904,3794
gen.NM_032905,2893
gen.NM_032907,4248
gen.NM_032928,2860
gen.NM_032929,2081
gen.NM_032933,5037
gen.NM_032951,2284
gen.NM_032953,2286
gen.NM_032958,2376
gen.NM_032989,3258
gen.NM_032997,2949
gen.NM_032999,2295
gen.NM_033008,1176
gen.NM_033010,1178
gen.NM_033011,2538
gen.NM_033022,2978
gen.NM_033046,796
gen.NM_033070,5937
gen.NM_033161,2828
gen.NM_033197,5729
gen.NM_033219,2730
gen.NM_033251,4635
gen.NM_033296,1404
gen.NM_033301,2635
gen.NM_033316,1348
gen.NM_033363,5417
gen.NM_033410,4456
gen.NM_033415,5355
gen.NM_033416,878
gen.NM_033421,5787
gen.NM_033440,60
gen.NM_033534,15
gen.NM_033544,4315
gen.NM_033551,1785
gen.NM_052837,426
gen.NM_052848,5451
gen.NM_052859,1157
gen.NM_052862,488
gen.NM_052881,5656
gen.NM_052886,2602
gen.NM_052936,6251
gen.NM_052963,2616
gen.NM_052984,3685
gen.NM_053043,2462
gen.NM_053056,3311

gen.NM_053275,3829
gen.NM_054012,2822
gen.NM_054013,1848
gen.NM_054014,5650
gen.NM_054016,95
gen.NM_057089,2363
gen.NM_057161,1890
gen.NM_057169,3790
gen.NM_057174,3188
gen.NM_057182,5376
gen.NM_058164,5230
gen.NM_058179,2703
gen.NM_058192,4366
gen.NM_058193,3422
gen.NM_058195,2653
gen.NM_058196,2657
gen.NM_058199,2836
gen.NM_078467,1912
gen.NM_079423,3648
gen.NM_079425,3650
gen.NM_080424,1016
gen.NM_080425,5828
gen.NM_080426,5832
gen.NM_080491,3342
gen.NM_080592,696
gen.NM_080594,4394
gen.NM_080598,1984
gen.NM_080648,3999
gen.NM_080649,4001
gen.NM_080670,1726
gen.NM_080686,1981
gen.NM_080687,3942
gen.NM_080702,1977
gen.NM_080703,1975
gen.NM_080796,5855
gen.NM_080797,5859
gen.NM_080820,5693
gen.NM_080822,4654
gen.NM_106552,670
gen.NM_130398,639
gen.NM_130442,2260
gen.NM_130468,4143
gen.NM_130898,434
gen.NM_133330,1376
gen.NM_133332,1380
gen.NM_133373,4885
gen.NM_133375,4222
gen.NM_133436,2357
gen.NM_133480,1051
gen.NM_133481,1053
gen.NM_133483,3676
gen.NM_133503,3742
gen.NM_133504,3744
gen.NM_133505,3746
gen.NM_133506,3750
gen.NM_133507,3748

gen.NM_133627,4786
gen.NM_133629,4790
gen.NM_133630,4788
gen.NM_133637,798
gen.NM_133645,2066
gen.NM_134269,6009
gen.NM_134323,3616
gen.NM_134324,3618
gen.NM_134440,5358
gen.NM_138385,1372
gen.NM_138391,545
gen.NM_138427,4739
gen.NM_138434,2451
gen.NM_138443,5060
gen.NM_138483,1037
gen.NM_138578,5713
gen.NM_138614,1125
gen.NM_138699,1406
gen.NM_138801,727
gen.NM_138924,5124
gen.XM_001289,524
gen.XM_001299,33
gen.XM_001389,1453
gen.XM_001468,342
gen.XM_001472,250
gen.XM_001482,3658
gen.XM_001589,24
gen.XM_001616,101
gen.XM_001640,126
gen.XM_001807,135
gen.XM_001812,134
gen.XM_001826,78
gen.XM_001897,486
gen.XM_001914,567
gen.XM_001916,568
gen.XM_001958,599
gen.XM_002068,523
gen.XM_002105,141
gen.XM_002114,113
gen.XM_002217,845
gen.XM_002255,1361
gen.XM_002435,700
gen.XM_002447,877
gen.XM_002480,680
gen.XM_002540,1006
gen.XM_002611,823
gen.XM_002636,964
gen.XM_002647,770
gen.XM_002669,946
gen.XM_002674,776
gen.XM_002704,853
gen.XM_002727,788
gen.XM_002739,779
gen.XM_002742,1036
gen.XM_002828,1143
gen.XM_002854,1187

gen.XM_002855,1186
gen.XM_002859,1274
gen.XM_002899,1127
gen.XM_003213,1162
gen.XM_003222,1119
gen.XM_003245,1136
gen.XM_003305,1451
gen.XM_003435,1432
gen.XM_003477,1530
gen.XM_003511,1448
gen.XM_003555,1500
gen.XM_003611,2083
gen.XM_003716,1811
gen.XM_003771,1644
gen.XM_003789,1712
gen.XM_003825,1540
gen.XM_003830,1666
gen.XM_003841,1699
gen.XM_003869,1572
gen.XM_003896,1581
gen.XM_003937,1710
gen.XM_004009,1565
gen.XM_004098,3704
gen.XM_004151,2065
gen.XM_004256,2114
gen.XM_004297,2113
gen.XM_004330,3194
gen.XM_004379,2122
gen.XM_004383,2130
gen.XM_004526,2110
gen.XM_004627,2402
gen.XM_004901,2292
gen.XM_005060,2605
gen.XM_005086,1042
gen.XM_005100,2908
gen.XM_005180,1332
gen.XM_005305,2485
gen.XM_005348,2755
gen.XM_005365,2760
gen.XM_005490,2707
gen.XM_005525,2727
gen.XM_005543,2666
gen.XM_005675,3103
gen.XM_005698,3053
gen.XM_005724,2878
gen.XM_005938,3058
gen.XM_005969,3088
gen.XM_006139,3127
gen.XM_006170,3201
gen.XM_006212,3167
gen.XM_006290,98
gen.XM_006297,3196
gen.XM_006424,3151
gen.XM_006432,3371
gen.XM_006464,3355
gen.XM_006467,3399

gen.XM_006475,3135
gen.XM_006483,3136
gen.XM_006529,3281
gen.XM_006533,3270
gen.XM_006566,3849
gen.XM_006578,3736
gen.XM_006589,3766
gen.XM_006595,3835
gen.XM_006694,3535
gen.XM_006710,3626
gen.XM_006748,3536
gen.XM_006826,3559
gen.XM_006887,3765
gen.XM_006925,3485
gen.XM_006936,3483
gen.XM_006937,5074
gen.XM_006947,3482
gen.XM_006958,3475
gen.XM_007002,3797
gen.XM_007003,3796
gen.XM_007199,3923
gen.XM_007254,4097
gen.XM_007272,4081
gen.XM_007288,3968
gen.XM_007293,3967
gen.XM_007315,3958
gen.XM_007316,3957
gen.XM_007324,4027
gen.XM_007328,4024
gen.XM_007441,4045
gen.XM_007483,4072
gen.XM_007488,4005
gen.XM_007491,3996
gen.XM_007531,4167
gen.XM_007545,4156
gen.XM_007623,4221
gen.XM_007651,4189
gen.XM_007751,4129
gen.XM_007963,4474
gen.XM_007988,4430
gen.XM_008064,4509
gen.XM_008065,4497
gen.XM_008106,4463
gen.XM_008126,4353
gen.XM_008150,4800
gen.XM_008231,4694
gen.XM_008253,4926
gen.XM_008323,4750
gen.XM_008334,4671
gen.XM_008351,4856
gen.XM_008401,4867
gen.XM_008402,4869
gen.XM_008432,4902
gen.XM_008441,4686
gen.XM_008459,4915
gen.XM_008462,4777

gen.XM_008486,4760
gen.XM_008509,4658
gen.XM_008538,4684
gen.XM_008557,4650
gen.XM_008579,4809
gen.XM_008679,4693
gen.XM_008695,5089
gen.XM_008723,5054
gen.XM_008812,5083
gen.XM_008830,5597
gen.XM_008851,5522
gen.XM_008854,5325
gen.XM_008860,5485
gen.XM_008878,5472
gen.XM_008887,5243
gen.XM_008912,5453
gen.XM_008985,5531
gen.XM_009010,5205
gen.XM_009036,5486
gen.XM_009063,5274
gen.XM_009082,5256
gen.XM_009125,5484
gen.XM_009126,5496
gen.XM_009149,5406
gen.XM_009180,5378
gen.XM_009203,5443
gen.XM_009222,5165
gen.XM_009277,5113
gen.XM_009279,5110
gen.XM_009293,5338
gen.XM_009303,5310
gen.XM_009330,5357
gen.XM_009338,5384
gen.XM_009436,5705
gen.XM_009450,5728
gen.XM_009501,5754
gen.XM_009549,5816
gen.XM_009622,5647
gen.XM_009642,5759
gen.XM_009671,5823
gen.XM_009672,5821
gen.XM_009686,5762
gen.XM_009805,5919
gen.XM_009947,6022
gen.XM_009967,6031
gen.XM_009973,6042
gen.XM_010000,6063
gen.XM_010002,6064
gen.XM_010024,6087
gen.XM_010029,6094
gen.XM_010040,6103
gen.XM_010055,6108
gen.XM_010117,6269
gen.XM_010141,6216
gen.XM_010156,5266
gen.XM_010178,6310

gen.XM_010272,6132
gen.XM_010362,6274
gen.XM_010378,6169
gen.XM_010436,6280
gen.XM_010494,3429
gen.XM_010615,253
gen.XM_010636,451
gen.XM_010664,133
gen.XM_010682,581
gen.XM_010712,182
gen.XM_010732,593
gen.XM_010778,925
gen.XM_010852,938
gen.XM_010858,1004
gen.XM_010866,992
gen.XM_010881,771
gen.XM_010886,755
gen.XM_010938,4641
gen.XM_010941,1433
gen.XM_010953,1130
gen.XM_010978,1290
gen.XM_011074,1320
gen.XM_011089,5076
gen.XM_011117,2059
gen.XM_011118,4941
gen.XM_011129,1423
gen.XM_011160,1365
gen.XM_011548,2411
gen.XM_011618,2400
gen.XM_011629,2533
gen.XM_011642,2586
gen.XM_011650,66
gen.XM_011657,2592
gen.XM_011749,2798
gen.XM_011752,2786
gen.XM_011769,2562
gen.XM_011778,2832
gen.XM_011988,3260
gen.XM_012124,3836
gen.XM_012145,3761
gen.XM_012159,3494
gen.XM_012162,3598
gen.XM_012179,5337
gen.XM_012182,3638
gen.XM_012184,3861
gen.XM_012219,3759
gen.XM_012272,3543
gen.XM_012284,2395
gen.XM_012376,3990
gen.XM_012377,3983
gen.XM_012398,4133
gen.XM_012418,4199
gen.XM_012462,4322
gen.XM_012487,4555
gen.XM_012549,4734
gen.XM_012569,4461

gen.XM_012609,4945
gen.XM_012615,4744
gen.XM_012634,4950
gen.XM_012638,3874
gen.XM_012642,4849
gen.XM_012651,4916
gen.XM_012676,4675
gen.XM_012741,5031
gen.XM_012798,5212
gen.XM_012812,5370
gen.XM_012860,5439
gen.XM_012862,5195
gen.XM_012913,5114
gen.XM_012931,5768
gen.XM_012970,5700
gen.XM_013010,6066
gen.XM_013015,6089
gen.XM_013029,6118
gen.XM_013042,6207
gen.XM_013060,6196
gen.XM_013086,6145
gen.XM_013112,2530
gen.XM_013127,2577
gen.XM_015234,75
gen.XM_015241,5088
gen.XM_015243,3148
gen.XM_015258,2244
gen.XM_015366,4239
gen.XM_015434,547
gen.XM_015462,1208
gen.XM_015468,3596
gen.XM_015476,3585
gen.XM_015481,3580
gen.XM_015516,6206
gen.XM_015563,1525
gen.XM_015652,2937
gen.XM_015697,5264
gen.XM_015700,4478
gen.XM_015705,3214
gen.XM_015717,257
gen.XM_015755,5046
gen.XM_015769,5369
gen.XM_015835,4311
gen.XM_015840,3921
gen.XM_015842,3932
gen.XM_015920,909
gen.XM_015922,911
gen.XM_016047,2604
gen.XM_016076,4237
gen.XM_016093,2992
gen.XM_016113,2712
gen.XM_016125,6275
gen.XM_016139,3170
gen.XM_016164,276
gen.XM_016170,1554
gen.XM_016199,600

gen.XM_016288,880
gen.XM_016308,2726
gen.XM_016334,1294
gen.XM_016345,1799
gen.XM_016351,3924
gen.XM_016378,5364
gen.XM_016382,5036
gen.XM_016410,5438
gen.XM_016480,326
gen.XM_016486,4071
gen.XM_016487,4068
gen.XM_016605,3708
gen.XM_016625,773
gen.XM_016640,3538
gen.XM_016674,1652
gen.XM_016700,2433
gen.XM_016713,4165
gen.XM_016733,2256
gen.XM_016843,766
gen.XM_016857,1941
gen.XM_016871,5180
gen.XM_016985,4213
gen.XM_017080,3436
gen.XM_017096,4644
gen.XM_017204,5240
gen.XM_017234,4712
gen.XM_017240,4135
gen.XM_017315,67
gen.XM_017356,1291
gen.XM_017364,1105
gen.XM_017369,3394
gen.XM_017432,3895
gen.XM_017442,2313
gen.XM_017474,1679
gen.XM_017483,2280
gen.XM_017508,3710
gen.XM_017517,2080
gen.XM_017578,4980
gen.XM_017591,1701
gen.XM_017641,1544
gen.XM_017698,861
gen.XM_017816,2581
gen.XM_017831,2119
gen.XM_017846,109
gen.XM_017857,1640
gen.XM_017914,3953
gen.XM_017925,1476
gen.XM_017930,6284
gen.XM_017931,2659
gen.XM_017971,4319
gen.XM_017984,4338
gen.XM_017996,2711
gen.XM_018006,2710
gen.XM_018019,6157
gen.XM_018039,784
gen.XM_018041,642

gen.XM_018054,4123
gen.XM_018088,4472
gen.XM_018108,6313
gen.XM_018109,6315
gen.XM_018136,161
gen.XM_018142,6232
gen.XM_018149,1264
gen.XM_018167,3015
gen.XM_018182,2098
gen.XM_018205,64
gen.XM_018241,6161
gen.XM_018279,3057
gen.XM_018287,2595
gen.XM_018301,763
gen.XM_018332,314
gen.XM_018359,2281
gen.XM_018399,3918
gen.XM_018432,4331
gen.XM_018473,1658
gen.XM_018515,5354
gen.XM_018523,1359
gen.XM_018534,4840
gen.XM_018539,6014
gen.XM_018540,841
gen.XM_026944,2787
gen.XM_026951,2771
gen.XM_026968,2769
gen.XM_026985,2766
gen.XM_026987,2765
gen.XM_027102,3802
gen.XM_027143,6106
gen.XM_027161,1220
gen.XM_027214,2385
gen.XM_027309,4329
gen.XM_027313,226
gen.XM_027365,4334
gen.XM_027412,4368
gen.XM_027440,2505
gen.XM_027558,4352
gen.XM_027651,2490
gen.XM_027679,2488
gen.XM_027825,4661
gen.XM_027904,5548
gen.XM_027916,76
gen.XM_027952,6353
gen.XM_027963,936
gen.XM_027964,1619
gen.XM_027983,213
gen.XM_028034,940
gen.XM_028064,5119
gen.XM_028067,5117
gen.XM_028151,4562
gen.XM_028192,3117
gen.XM_028263,5488
gen.XM_028267,5491
gen.XM_028322,4075

gen.XM_028347,4074
gen.XM_028358,4073
gen.XM_028398,4667
gen.XM_028417,4678
gen.XM_028643,3624
gen.XM_028662,3561
gen.XM_028666,5383
gen.XM_028672,5382
gen.XM_028744,5025
gen.XM_028760,3554
gen.XM_028783,5851
gen.XM_028806,5765
gen.XM_028810,5766
gen.XM_028834,5863
gen.XM_028848,4390
gen.XM_028918,5867
gen.XM_028966,5871
gen.XM_029031,169
gen.XM_029096,1539
gen.XM_029104,1314
gen.XM_029132,1313
gen.XM_029136,1310
gen.XM_029168,2841
gen.XM_029187,6194
gen.XM_029228,2069
gen.XM_029288,4067
gen.XM_029369,1198
gen.XM_029438,4656
gen.XM_029450,5404
gen.XM_029455,5403
gen.XM_029461,6282
gen.XM_029567,2609
gen.XM_029631,3602
gen.XM_029728,3595
gen.XM_029746,2128
gen.XM_029805,3507
gen.XM_029810,5776
gen.XM_029822,5778
gen.XM_029842,176
gen.XM_029844,145
gen.XM_030044,5796
gen.XM_030203,1028
gen.XM_030268,2543
gen.XM_030274,2544
gen.XM_030326,3187
gen.XM_030373,6233
gen.XM_030417,1112
gen.XM_030423,154
gen.XM_030447,3065
gen.XM_030470,68
gen.XM_030485,5159
gen.XM_030529,862
gen.XM_030582,883
gen.XM_030621,5818
gen.XM_030699,5834
gen.XM_030714,5145

gen.XM_030720,5137
gen.XM_030721,5135
gen.XM_030771,1821
gen.XM_030777,1823
gen.XM_030782,1824
gen.XM_030812,1256
gen.XM_030834,952
gen.XM_030895,5465
gen.XM_030901,5456
gen.XM_030914,5450
gen.XM_030920,40
gen.XM_031025,4032
gen.XM_031074,4039
gen.XM_031251,5307
gen.XM_031263,5305
gen.XM_031273,5303
gen.XM_031276,5302
gen.XM_031292,4295
gen.XM_031320,1445
gen.XM_031345,5292
gen.XM_031354,4292
gen.XM_031404,4285
gen.XM_031415,4767
gen.XM_031427,4769
gen.XM_031466,4765
gen.XM_031515,4147
gen.XM_031519,731
gen.XM_031527,733
gen.XM_031536,4758
gen.XM_031554,4145
gen.XM_031585,782
gen.XM_031586,783
gen.XM_031596,780
gen.XM_031617,4138
gen.XM_031626,738
gen.XM_031718,4159
gen.XM_031807,3491
gen.XM_031857,5184
gen.XM_031866,3041
gen.XM_031890,3044
gen.XM_031917,5176
gen.XM_031944,5066
gen.XM_031949,3049
gen.XM_031992,3059
gen.XM_032020,5281
gen.XM_032121,2455
gen.XM_032201,4836
gen.XM_032216,2454
gen.XM_032269,1221
gen.XM_032285,5399
gen.XM_032391,216
gen.XM_032403,4180
gen.XM_032443,3930
gen.XM_032476,2976
gen.XM_032520,2970
gen.XM_032553,1626

gen.XM_032588,3457
gen.XM_032614,3462
gen.XM_032710,5247
gen.XM_032719,5248
gen.XM_032724,5252
gen.XM_032759,1700
gen.XM_032766,4864
gen.XM_032774,5257
gen.XM_032782,5261
gen.XM_032813,4863
gen.XM_032817,4861
gen.XM_032852,4857
gen.XM_032895,1590
gen.XM_032902,1588
gen.XM_032930,6189
gen.XM_032944,2470
gen.XM_032996,5943
gen.XM_033015,5902
gen.XM_033016,5903
gen.XM_033090,5946
gen.XM_033147,6241
gen.XM_033227,3450
gen.XM_033232,6351
gen.XM_033251,3959
gen.XM_033263,3472
gen.XM_033294,1123
gen.XM_033337,3964
gen.XM_033355,2819
gen.XM_033359,2818
gen.XM_033360,2817
gen.XM_033361,2815
gen.XM_033362,2811
gen.XM_033380,2809
gen.XM_033385,2808
gen.XM_033391,3969
gen.XM_033424,2774
gen.XM_033435,3975
gen.XM_033445,3980
gen.XM_033457,2777
gen.XM_033460,2778
gen.XM_033553,3991
gen.XM_033595,3994
gen.XM_033654,79
gen.XM_033683,77
gen.XM_033689,4646
gen.XM_033714,4645
gen.XM_033813,5960
gen.XM_033862,6173
gen.XM_033876,2383
gen.XM_033878,6172
gen.XM_033884,6170
gen.XM_033910,2134
gen.XM_033912,2132
gen.XM_033922,4606
gen.XM_034000,501
gen.XM_034082,454

gen.XM_034321,1502
gen.XM_034375,4460
gen.XM_034377,5623
gen.XM_034431,3185
gen.XM_034586,4376
gen.XM_034590,4380
gen.XM_034640,2638
gen.XM_034662,319
gen.XM_034671,318
gen.XM_034710,1466
gen.XM_034713,1468
gen.XM_034744,1655
gen.XM_034862,1675
gen.XM_034890,4184
gen.XM_034897,4256
gen.XM_034935,6201
gen.XM_034952,857
gen.XM_034953,4116
gen.XM_035014,4119
gen.XM_035103,2824
gen.XM_035107,2439
gen.XM_035109,2825
gen.XM_035220,800
gen.XM_035368,2626
gen.XM_035370,2631
gen.XM_035373,2629
gen.XM_035465,6123
gen.XM_035485,3571
gen.XM_035490,3564
gen.XM_035497,3562
gen.XM_035572,1392
gen.XM_035625,5197
gen.XM_035627,5196
gen.XM_035636,5194
gen.XM_035638,5192
gen.XM_035640,5034
gen.XM_035662,2483
gen.XM_035680,2482
gen.XM_035824,1402
gen.XM_035919,5612
gen.XM_035986,1456
gen.XM_035999,5907
gen.XM_036002,1440
gen.XM_036011,5910
gen.XM_036042,5913
gen.XM_036087,5917
gen.XM_036104,4965
gen.XM_036107,5923
gen.XM_036115,4971
gen.XM_036118,1262
gen.XM_036175,5924
gen.XM_036299,155
gen.XM_036339,3178
gen.XM_036413,2469
gen.XM_036450,664
gen.XM_036462,4827

gen.XM_036465,4825
gen.XM_036500,573
gen.XM_036507,575
gen.XM_036528,4410
gen.XM_036556,566
gen.XM_036593,2939
gen.XM_036659,4707
gen.XM_036680,4342
gen.XM_036727,4134
gen.XM_036744,433
gen.XM_036755,5927
gen.XM_036785,4982
gen.XM_036829,442
gen.XM_036845,450
gen.XM_036934,448
gen.XM_036937,5969
gen.XM_036938,1197
gen.XM_037002,1668
gen.XM_037056,2107
gen.XM_037101,873
gen.XM_037108,831
gen.XM_037147,3212
gen.XM_037173,3202
gen.XM_037195,4988
gen.XM_037196,4987
gen.XM_037202,5840
gen.XM_037206,5842
gen.XM_037217,5846
gen.XM_037260,1608
gen.XM_037329,591
gen.XM_037377,1300
gen.XM_037381,1299
gen.XM_037423,1163
gen.XM_037468,6114
gen.XM_037474,6116
gen.XM_037565,5106
gen.XM_037572,5109
gen.XM_037600,1304
gen.XM_037657,2608
gen.XM_037662,5372
gen.XM_037682,5977
gen.XM_037741,2276
gen.XM_037778,4244
gen.XM_037797,5981
gen.XM_037808,3263
gen.XM_037875,2045
gen.XM_037945,5993
gen.XM_037971,4897
gen.XM_038030,2855
gen.XM_038049,2864
gen.XM_038063,2866
gen.XM_038098,5343
gen.XM_038146,5339
gen.XM_038221,1695
gen.XM_038243,1341
gen.XM_038308,3737

gen.XM_038371,3902
gen.XM_038391,2757
gen.XM_038424,5018
gen.XM_038536,2909
gen.XM_038576,734
gen.XM_038584,6019
gen.XM_038659,3533
gen.XM_038791,3841
gen.XM_038852,244
gen.XM_038872,5062
gen.XM_038911,237
gen.XM_038946,1840
gen.XM_039165,1413
gen.XM_039173,1416
gen.XM_039176,1417
gen.XM_039225,4125
gen.XM_039236,6047
gen.XM_039248,6051
gen.XM_039306,4551
gen.XM_039339,6060
gen.XM_039372,6065
gen.XM_039395,3732
gen.XM_039474,4794
gen.XM_039654,2646
gen.XM_039702,4200
gen.XM_039712,716
gen.XM_039721,321
gen.XM_039723,5140
gen.XM_039796,1292
gen.XM_039805,1258
gen.XM_039908,5598
gen.XM_039910,4721
gen.XM_039921,4732
gen.XM_039952,1213
gen.XM_039975,1783
gen.XM_040009,377
gen.XM_040066,6088
gen.XM_040095,6091
gen.XM_040221,3707
gen.XM_040267,2879
gen.XM_040272,2876
gen.XM_040321,1524
gen.XM_040498,2417
gen.XM_040623,2074
gen.XM_040644,3734
gen.XM_040709,315
gen.XM_040752,1493
gen.XM_040853,2218
gen.XM_040898,4100
gen.XM_040942,4094
gen.XM_040952,4090
gen.XM_041014,4086
gen.XM_041020,2697
gen.XM_041059,1670
gen.XM_041100,3503
gen.XM_041209,3925

gen.XM_041211,1161
gen.XM_041221,1410
gen.XM_041235,4008
gen.XM_041248,6111
gen.XM_041473,3928
gen.XM_041484,3944
gen.XM_041507,1147
gen.XM_041583,4957
gen.XM_041678,5027
gen.XM_041694,1614
gen.XM_041712,1592
gen.XM_041872,5090
gen.XM_041879,353
gen.XM_041884,354
gen.XM_041921,6304
gen.XM_041964,4680
gen.XM_042018,5095
gen.XM_042025,1600
gen.XM_042153,6348
gen.XM_042155,6346
gen.XM_042168,1286
gen.XM_042301,1474
gen.XM_042326,1032
gen.XM_042422,2145
gen.XM_042473,2148
gen.XM_042618,1229
gen.XM_042621,4596
gen.XM_042658,2561
gen.XM_042695,1364
gen.XM_042698,4710
gen.XM_042765,5701
gen.XM_042781,2434
gen.XM_042788,2744
gen.XM_042841,1072
gen.XM_042852,3339
gen.XM_042860,1070
gen.XM_042963,6295
gen.XM_042967,537
gen.XM_042968,6297
gen.XM_043047,4577
gen.XM_043173,866
gen.XM_043220,3111
gen.XM_043340,1805
gen.XM_043388,1808
gen.XM_043589,2998
gen.XM_043605,2999
gen.XM_043614,6099
gen.XM_043643,6250
gen.XM_043771,1568
gen.XM_044075,416
gen.XM_044077,391
gen.XM_044127,398
gen.XM_044128,408
gen.XM_044166,406
gen.XM_044172,411
gen.XM_044334,3859

gen.XM_044354,2968
gen.XM_044367,4938
gen.XM_044372,4943
gen.XM_044376,4935
gen.XM_044394,4927
gen.XM_044426,4924
gen.XM_044523,4304
gen.XM_044533,4307
gen.XM_044565,4269
gen.XM_044569,4272
gen.XM_044593,4278
gen.XM_044608,5213
gen.XM_044619,5210
gen.XM_044627,2563
gen.XM_044866,2139
gen.XM_044914,5658
gen.XM_044915,5660
gen.XM_044932,3129
gen.XM_044957,3131
gen.XM_045010,3821
gen.XM_045044,4749
gen.XM_045104,4989
gen.XM_045140,2973
gen.XM_045151,5226
gen.XM_045170,928
gen.XM_045183,4651
gen.XM_045187,3833
gen.XM_045283,757
gen.XM_045290,1214
gen.XM_045296,2759
gen.XM_045401,2403
gen.XM_045418,5667
gen.XM_045451,5671
gen.XM_045460,5674
gen.XM_045499,3276
gen.XM_045525,3278
gen.XM_045535,4751
gen.XM_045551,4752
gen.XM_045581,4996
gen.XM_045602,3856
gen.XM_045612,3273
gen.XM_045613,3271
gen.XM_045642,3269
gen.XM_045667,3074
gen.XM_045681,4287
gen.XM_045750,3157
gen.XM_045802,3826
gen.XM_045856,2407
gen.XM_045901,4852
gen.XM_045952,2413
gen.XM_045963,3834
gen.XM_046001,2414
gen.XM_046035,4453
gen.XM_046041,3726
gen.XM_046057,1443
gen.XM_046090,5423

gen.XM_046160,5708
gen.XM_046179,5710
gen.XM_046313,5544
gen.XM_046349,187
gen.XM_046401,1085
gen.XM_046419,5578
gen.XM_046450,201
gen.XM_046464,522
gen.XM_046472,5004
gen.XM_046481,4999
gen.XM_046520,5689
gen.XM_046551,212
gen.XM_046557,208
gen.XM_046565,204
gen.XM_046642,3951
gen.XM_046648,3950
gen.XM_046651,3949
gen.XM_046743,3035
gen.XM_046765,5020
gen.XM_046767,5022
gen.XM_046769,5021
gen.XM_046822,5150
gen.XM_046836,2722
gen.XM_046863,2720
gen.XM_046918,112
gen.XM_046932,4958
gen.XM_046934,5160
gen.XM_047007,5723
gen.XM_047011,5725
gen.XM_047018,5727
gen.XM_047024,6177
gen.XM_047032,6176
gen.XM_047083,2521
gen.XM_047175,690
gen.XM_047374,5446
gen.XM_047376,5445
gen.XM_047409,5444
gen.XM_047436,4624
gen.XM_047477,1429
gen.XM_047479,495
gen.XM_047499,610
gen.XM_047525,4632
gen.XM_047545,616
gen.XM_047561,1137
gen.XM_047584,5131
gen.XM_047600,5132
gen.XM_047964,1798
gen.XM_048088,753
gen.XM_048119,4344
gen.XM_048258,5385
gen.XM_048286,3255
gen.XM_048351,5218
gen.XM_048364,5219
gen.XM_048404,6329
gen.XM_048410,6328
gen.XM_048420,6325

gen.XM_048471,5082
gen.XM_048479,2679
gen.XM_048518,2684
gen.XM_048539,2686
gen.XM_048603,3674
gen.XM_048654,4829
gen.XM_048690,1007
gen.XM_048780,57
gen.XM_048859,2881
gen.XM_048905,6306
gen.XM_048943,3640
gen.XM_048957,3931
gen.XM_048991,3642
gen.XM_049048,3652
gen.XM_049108,820
gen.XM_049113,822
gen.XM_049116,818
gen.XM_049141,3586
gen.XM_049148,3581
gen.XM_049150,3659
gen.XM_049197,3161
gen.XM_049201,3772
gen.XM_049211,3771
gen.XM_049226,2623
gen.XM_049237,5391
gen.XM_049247,2618
gen.XM_049282,5223
gen.XM_049310,139
gen.XM_049337,6320
gen.XM_049354,4275
gen.XM_049372,4317
gen.XM_049421,2637
gen.XM_049502,5236
gen.XM_049561,5239
gen.XM_049663,3493
gen.XM_049680,476
gen.XM_049690,483
gen.XM_049742,14
gen.XM_049795,3082
gen.XM_049899,2121
gen.XM_049904,3937
gen.XM_049920,5482
gen.XM_049931,4995
gen.XM_049934,4994
gen.XM_049937,4818
gen.XM_050074,3528
gen.XM_050101,4773
gen.XM_050159,4880
gen.XM_050194,4462
gen.XM_050200,1487
gen.XM_050215,2525
gen.XM_050236,5602
gen.XM_050265,2278
gen.XM_050278,4103
gen.XM_050293,2487
gen.XM_050403,6192

gen.XM_050430,2389
gen.XM_050435,5227
gen.XM_050506,2583
gen.XM_050534,4348
gen.XM_050552,1234
gen.XM_050589,5603
gen.XM_050638,979
gen.XM_050660,5330
gen.XM_050731,2571
gen.XM_050891,984
gen.XM_050962,975
gen.XM_050964,4220
gen.XM_051219,4479
gen.XM_051264,1237
gen.XM_051298,2612
gen.XM_051364,5290
gen.XM_051430,3398
gen.XM_051435,3358
gen.XM_051463,4230
gen.XM_051471,6238
gen.XM_051476,6237
gen.XM_051489,3367
gen.XM_051518,1131
gen.XM_051556,6
gen.XM_051586,5092
gen.XM_051712,4025
gen.XM_051716,3373
gen.XM_051763,4727
gen.XM_051778,4600
gen.XM_051860,4298
gen.XM_051877,515
gen.XM_052113,3378
gen.XM_052310,1060
gen.XM_052313,1535
gen.XM_052336,1477
gen.XM_052460,3714
gen.XM_052474,3719
gen.XM_052530,1424
gen.XM_052542,3755
gen.XM_052626,1398
gen.XM_052635,5166
gen.XM_052641,3769
gen.XM_052661,5168
gen.XM_052721,2056
gen.XM_052725,2784
gen.XM_052786,3153
gen.XM_052862,3404
gen.XM_052893,3825
gen.XM_052974,608
gen.XM_052989,817
gen.XM_053074,5430
gen.XM_053122,1363
gen.XM_053164,3641
gen.XM_053183,58
gen.XM_053206,2875
gen.XM_053245,400

gen.XM_053323,1078
gen.XM_053585,4252
gen.XM_053633,544
gen.XM_053712,1074
gen.XM_053717,4663
gen.XM_053787,3283
gen.XM_053796,3288
gen.XM_053952,3722
gen.XM_053955,1859
gen.XM_054038,4832
gen.XM_054098,6183
gen.XM_054221,6155
gen.XM_054344,4973
gen.XM_054474,2933
gen.XM_054475,2935
gen.XM_054520,1047
gen.XM_054566,5926
gen.XM_054706,2146
gen.XM_054752,2849
gen.XM_054763,2852
gen.XM_054856,3193
gen.XM_054868,228
gen.XM_054900,4309
gen.XM_054978,295
gen.XM_055013,3853
gen.XM_055061,4826
gen.XM_055132,4514
gen.XM_055195,4427
gen.XM_055199,4942
gen.XM_055230,5336
gen.XM_055254,954
gen.XM_055369,3397
gen.XM_055481,251
gen.XM_055551,1461
gen.XM_055573,3086
gen.XM_055641,2064
gen.XM_055658,5592
gen.XM_055686,5163
gen.XM_055771,4505
gen.XM_055859,5483
gen.XM_055880,583
gen.XM_055993,5646
gen.XM_056035,5678
gen.XM_056082,4648
gen.XM_056260,4438
gen.XM_056286,5582
gen.XM_056315,1723
gen.XM_056317,4077
gen.XM_056346,3645
gen.XM_056353,3662
gen.XM_056421,5175
gen.XM_056481,3545
gen.XM_056602,5408
gen.XM_056681,3700
gen.XM_056730,4775
gen.XM_056884,618

gen.XM_056923,521
gen.XM_056957,1471
gen.XM_056963,1793
gen.XM_056970,628
gen.XM_056996,3798
gen.XM_057020,4257
gen.XM_057074,5260
gen.XM_057150,4619
gen.XM_057236,5756
gen.XM_057374,5793
gen.XM_057492,1548
gen.XM_057664,740
gen.XM_057780,2557
gen.XM_057994,1541
gen.XM_058039,1934
gen.XM_058098,986
gen.XM_058116,4526
gen.XM_058125,5635
gen.XM_058210,4018
gen.XM_058232,5225
gen.XM_058240,102
gen.XM_058247,466
gen.XM_058266,2144
gen.XM_058267,1278
gen.XM_058343,3020
gen.XM_058361,3078
gen.XM_058405,552
gen.XM_058406,3084
gen.XM_058414,3159
gen.XM_058450,3352
gen.XM_058505,3125
gen.XM_058528,3671
gen.XM_058556,3773
gen.XM_058567,3504
gen.XM_058574,3454
gen.XM_058602,3022
gen.XM_058611,3926
gen.XM_058618,4091
gen.XM_058636,4118
gen.XM_058646,3986
gen.XM_058647,3978
gen.XM_058677,4061
gen.XM_058684,4186
gen.XM_058699,4250
gen.XM_058702,294
gen.XM_058739,4621
gen.XM_058745,4543
gen.XM_058784,4404
gen.XM_058796,4337
gen.XM_058830,4803
gen.XM_058867,4755
gen.XM_058900,4730
gen.XM_058918,5949
gen.XM_058927,1441
gen.XM_058949,5463
gen.XM_058967,5295

gen.XM_058968,2619
gen.XM_058977,3920
gen.XM_058987,5570
gen.XM_058990,5584
gen.XM_058991,5552
gen.XM_059045,5419
gen.XM_059052,5447
gen.XM_059066,114
gen.XM_059067,120
gen.XM_059088,130
gen.XM_059094,465
gen.XM_059117,103
gen.XM_059120,562
gen.XM_059133,224
gen.XM_059171,171
gen.XM_059180,256
gen.XM_059191,492
gen.XM_059201,1
gen.XM_059210,330
gen.XM_059214,185
gen.XM_059230,55
gen.XM_059268,5675
gen.XM_059321,5607
gen.XM_059335,6013
gen.XM_059351,920
gen.XM_059368,653
gen.XM_059372,1029
gen.XM_059422,968
gen.XM_059461,971
gen.XM_059465,907
gen.XM_059516,1266
gen.XM_059557,1068
gen.XM_059561,1059
gen.XM_059583,1252
gen.XM_059593,1434
gen.XM_059623,1519
gen.XM_059628,1442
gen.XM_059633,1469
gen.XM_059637,2804
gen.XM_059653,1596
gen.XM_059669,1617
gen.XM_059709,1604
gen.XM_059720,2914
gen.XM_059741,2118
gen.XM_059745,2131
gen.XM_059773,2141
gen.XM_059776,2062
gen.XM_059801,1939
gen.XM_059839,2430
gen.XM_059876,2282
gen.XM_059933,2531
gen.XM_059945,2838
gen.XM_059961,2859
gen.XM_059966,2871
gen.XM_059979,2644
gen.XM_059986,2813

gen.XM_059998,2673
gen.XM_060006,2647
gen.XM_060012,4115
gen.XM_060030,6146
gen.XM_060042,4281
gen.XM_060067,1499
gen.XM_060331,509
gen.XM_060517,531
gen.XM_060976,2885
gen.XM_061125,2931
gen.XM_061126,2930
gen.XM_062437,3775
gen.XM_063639,4234
gen.XM_064091,4597
gen.XM_065884,777
gen.XM_066291,5998
gen.XM_066900,6261
gen.XM_067264,1240
gen.XM_067325,5030
gen.XM_067715,1169
gen.XM_068164,1497
gen.XM_068395,1789
gen.XM_068853,1714
gen.XM_068919,2085
gen.XM_068963,2072
gen.XM_070188,2480
gen.XM_070203,2473
gen.XM_070873,2742
gen.XM_071178,2705
gen.XM_071580,1557
gen.XM_071605,2381
gen.XM_071623,1439
gen.XM_071801,4122
gen.XM_071873,4630
gen.XM_071937,2152
gen.XM_072173,5876
gen.XM_072430,2387
gen.XM_072526,2857
gen.XM_076414,1199
gen.XM_083842,3026
gen.XM_083852,3141
gen.XM_083864,3774
gen.XM_083866,3715
gen.XM_083868,3590
gen.XM_083892,3787
gen.XM_083939,4364
gen.XM_083966,4923
gen.XM_083983,4881
gen.XM_084007,5055
gen.XM_084014,5246
gen.XM_084023,5528
gen.XM_084026,5549
gen.XM_084055,580
gen.XM_084084,6090
gen.XM_084110,1340
gen.XM_084111,1243

gen.XM_084120,1315
gen.XM_084123,1263
gen.XM_084129,1231
gen.XM_084141,1041
gen.XM_084158,1465
gen.XM_084168,1547
gen.XM_084179,1591
gen.XM_084180,1781
gen.XM_084204,2079
gen.XM_084238,2453
gen.XM_084241,2337
gen.XM_084270,2851
gen.XM_084283,6229
gen.XM_084287,6203
gen.XM_084288,6153
gen.XM_084296,6227
gen.XM_084311,6350
gen.XM_084359,3073
gen.XM_084372,3016
gen.XM_084385,2944
gen.XM_084413,3028
gen.XM_084420,2910
gen.XM_084429,2911
gen.XM_084450,2942
gen.XM_084451,2953
gen.XM_084467,2994
gen.XM_084477,3010
gen.XM_084480,3012
gen.XM_084505,3080
gen.XM_084514,3180
gen.XM_084515,3183
gen.XM_084516,3182
gen.XM_084517,3184
gen.XM_084522,3424
gen.XM_084525,3428
gen.XM_084527,3169
gen.XM_084570,3357
gen.XM_084601,3353
gen.XM_084610,3350
gen.XM_084632,3072
gen.XM_084645,3731
gen.XM_084654,3388
gen.XM_084658,3382
gen.XM_084681,3195
gen.XM_084702,3287
gen.XM_084739,3124
gen.XM_084742,3122
gen.XM_084770,3515
gen.XM_084789,3599
gen.XM_084800,3783
gen.XM_084801,3672
gen.XM_084807,3531
gen.XM_084808,3818
gen.XM_084824,3630
gen.XM_084841,3540
gen.XM_084866,3557

gen.XM_084884,3583
gen.XM_084885,3582
gen.XM_084889,3814
gen.XM_084901,3488
gen.XM_084909,3702
gen.XM_084912,3705
gen.XM_084918,3500
gen.XM_084922,3495
gen.XM_084941,3788
gen.XM_084946,3800
gen.XM_084948,3804
gen.XM_084982,3870
gen.XM_084997,3933
gen.XM_084998,2142
gen.XM_085017,3893
gen.XM_085044,3916
gen.XM_085065,4044
gen.XM_085066,4033
gen.XM_085068,1480
gen.XM_085106,3987
gen.XM_085125,4031
gen.XM_085127,4014
gen.XM_085141,4019
gen.XM_085151,4050
gen.XM_085162,4054
gen.XM_085166,3955
gen.XM_085203,4130
gen.XM_085204,4132
gen.XM_085215,4282
gen.XM_085239,4254
gen.XM_085249,4236
gen.XM_085262,4314
gen.XM_085280,4289
gen.XM_085283,4211
gen.XM_085307,4160
gen.XM_085327,4622
gen.XM_085340,4448
gen.XM_085393,4480
gen.XM_085395,4482
gen.XM_085408,4637
gen.XM_085434,4524
gen.XM_085442,4513
gen.XM_085445,4425
gen.XM_085452,4435
gen.XM_085471,4558
gen.XM_085475,4561
gen.XM_085483,4616
gen.XM_085525,4323
gen.XM_085531,4977
gen.XM_085545,4741
gen.XM_085548,4735
gen.XM_085563,4991
gen.XM_085581,472
gen.XM_085589,4948
gen.XM_085613,4724
gen.XM_085627,4951

gen.XM_085636,4873
gen.XM_085672,4757
gen.XM_085687,4659
gen.XM_085691,4677
gen.XM_085716,4992
gen.XM_085722,4745
gen.XM_085735,5019
gen.XM_085743,4718
gen.XM_085775,5058
gen.XM_085779,5075
gen.XM_085788,5049
gen.XM_085789,5043
gen.XM_085790,5045
gen.XM_085791,5042
gen.XM_085856,5501
gen.XM_085862,5244
gen.XM_085874,5460
gen.XM_085875,5461
gen.XM_085876,5462
gen.XM_085909,5297
gen.XM_085916,5285
gen.XM_085917,5276
gen.XM_085927,5527
gen.XM_085928,5489
gen.XM_085934,5537
gen.XM_085935,5573
gen.XM_085950,5487
gen.XM_085971,5371
gen.XM_085972,5629
gen.XM_085981,4599
gen.XM_085986,5398
gen.XM_086004,5425
gen.XM_086074,5311
gen.XM_086101,5128
gen.XM_086102,5130
gen.XM_086116,5331
gen.XM_086132,304
gen.XM_086138,282
gen.XM_086142,557
gen.XM_086151,46
gen.XM_086164,277
gen.XM_086165,279
gen.XM_086166,281
gen.XM_086167,280
gen.XM_086178,4
gen.XM_086180,19
gen.XM_086204,38
gen.XM_086228,1356
gen.XM_086244,601
gen.XM_086245,602
gen.XM_086257,632
gen.XM_086271,383
gen.XM_086278,4434
gen.XM_086282,543
gen.XM_086296,331
gen.XM_086324,214

gen.XM_086328,542
gen.XM_086343,265
gen.XM_086357,85
gen.XM_086360,29
gen.XM_086375,97
gen.XM_086378,485
gen.XM_086381,479
gen.XM_086384,178
gen.XM_086389,243
gen.XM_086391,231
gen.XM_086397,323
gen.XM_086400,366
gen.XM_086428,2161
gen.XM_086431,589
gen.XM_086432,592
gen.XM_086444,136
gen.XM_086481,490
gen.XM_086484,494
gen.XM_086485,493
gen.XM_086494,538
gen.XM_086515,324
gen.XM_086518,317
gen.XM_086543,190
gen.XM_086552,432
gen.XM_086564,388
gen.XM_086567,430
gen.XM_086586,52
gen.XM_086587,54
gen.XM_086648,5819
gen.XM_086701,5687
gen.XM_086710,5670
gen.XM_086715,5695
gen.XM_086736,5717
gen.XM_086745,5712
gen.XM_086759,5877
gen.XM_086760,5878
gen.XM_086770,5914
gen.XM_086773,5928
gen.XM_086777,5930
gen.XM_086779,5064
gen.XM_086805,5963
gen.XM_086809,5953
gen.XM_086821,5985
gen.XM_086830,6043
gen.XM_086844,6074
gen.XM_086873,5964
gen.XM_086875,6093
gen.XM_086920,805
gen.XM_086923,849
gen.XM_086925,850
gen.XM_086944,933
gen.XM_086950,858
gen.XM_086961,926
gen.XM_086980,791
gen.XM_087028,942
gen.XM_087038,2803

gen.XM_087040,842
gen.XM_087041,2800
gen.XM_087045,932
gen.XM_087051,748
gen.XM_087061,912
gen.XM_087062,914
gen.XM_087068,775
gen.XM_087069,772
gen.XM_087118,891
gen.XM_087122,839
gen.XM_087151,683
gen.XM_087162,985
gen.XM_087166,993
gen.XM_087181,965
gen.XM_087193,726
gen.XM_087195,725
gen.XM_087206,669
gen.XM_087211,743
gen.XM_087218,1011
gen.XM_087240,901
gen.XM_087254,1302
gen.XM_087268,1203
gen.XM_087278,1358
gen.XM_087284,1075
gen.XM_087289,1323
gen.XM_087295,1322
gen.XM_087297,1360
gen.XM_087322,1312
gen.XM_087331,1211
gen.XM_087341,1267
gen.XM_087342,1265
gen.XM_087346,1115
gen.XM_087349,1106
gen.XM_087359,1343
gen.XM_087370,1101
gen.XM_087392,1333
gen.XM_087410,1347
gen.XM_087448,1184
gen.XM_087480,3000
gen.XM_087498,1463
gen.XM_087514,1483
gen.XM_087527,1455
gen.XM_087583,1418
gen.XM_087588,1120
gen.XM_087597,1549
gen.XM_087599,1551
gen.XM_087600,1553
gen.XM_087601,1550
gen.XM_087610,1597
gen.XM_087611,1595
gen.XM_087614,1564
gen.XM_087621,1711
gen.XM_087635,1660
gen.XM_087637,1662
gen.XM_087652,1713
gen.XM_087659,1537

gen.XM_087686,1543
gen.XM_087710,3247
gen.XM_087713,1559
gen.XM_087745,1656
gen.XM_087773,1816
gen.XM_087790,1631
gen.XM_087823,1858
gen.XM_087834,2123
gen.XM_087836,2124
gen.XM_087853,2090
gen.XM_087855,2089
gen.XM_087939,2000
gen.XM_087945,1990
gen.XM_087955,3857
gen.XM_087960,1883
gen.XM_087990,1936
gen.XM_087991,2154
gen.XM_088009,3106
gen.XM_088020,1621
gen.XM_088073,2386
gen.XM_088099,2416
gen.XM_088103,2418
gen.XM_088105,2409
gen.XM_088107,605
gen.XM_088119,2422
gen.XM_088122,2420
gen.XM_088135,2446
gen.XM_088180,2352
gen.XM_088239,2297
gen.XM_088264,2195
gen.XM_088294,2529
gen.XM_088316,2611
gen.XM_088321,2628
gen.XM_088323,2574
gen.XM_088325,2572
gen.XM_088336,2519
gen.XM_088338,2515
gen.XM_088370,2613
gen.XM_088399,2559
gen.XM_088401,2560
gen.XM_088422,2839
gen.XM_088426,2833
gen.XM_088459,2847
gen.XM_088461,2870
gen.XM_088472,1472
gen.XM_088550,2640
gen.XM_088552,2641
gen.XM_088553,2642
gen.XM_088563,2672
gen.XM_088569,2748
gen.XM_088571,2750
gen.XM_088587,4120
gen.XM_088588,4114
gen.XM_088589,4121
gen.XM_088592,6311
gen.XM_088619,6151

gen.XM_088622,6152
gen.XM_088630,6209
gen.XM_088637,2700
gen.XM_088638,768
gen.XM_088665,6158
gen.XM_088688,6220
gen.XM_088689,6218
gen.XM_088710,6253
gen.XM_088736,6265
gen.XM_088738,6267
gen.XM_088739,6268
gen.XM_088745,6289
gen.XM_088747,6128
gen.XM_088788,338
gen.XM_088863,286
gen.XM_088945,507
gen.XM_089030,622
gen.XM_089138,254
gen.XM_089514,3019
gen.XM_089551,3006
gen.XM_090218,3542
gen.XM_090413,3779
gen.XM_090458,3767
gen.XM_090833,638
gen.XM_090914,4082
gen.XM_090991,4191
gen.XM_091076,1091
gen.XM_091100,4263
gen.XM_091108,4124
gen.XM_091159,4157
gen.XM_091270,4483
gen.XM_091399,4590
gen.XM_091420,4544
gen.XM_091786,3426
gen.XM_091886,5595
gen.XM_091938,5221
gen.XM_091981,5586
gen.XM_091984,5396
gen.XM_092042,5108
gen.XM_092046,5341
gen.XM_092049,5380
gen.XM_092135,672
gen.XM_092158,918
gen.XM_092346,944
gen.XM_092489,867
gen.XM_092517,676
gen.XM_092545,970
gen.XM_092760,5696
gen.XM_092888,5986
gen.XM_092966,6113
gen.XM_093050,6212
gen.XM_093130,6226
gen.XM_093219,6299
gen.XM_093241,6228
gen.XM_093423,1308
gen.XM_093487,1255

gen.XM_093546,1201
gen.XM_093624,1083
gen.XM_094243,1797
gen.XM_094440,1561
gen.XM_094741,1862
gen.XM_094855,2060
gen.XM_095146,2432
gen.XM_095371,2475
gen.XM_095545,2514
gen.XM_095667,2554
gen.XM_096038,3699
gen.XM_096060,4241
gen.XM_096146,3539
gen.XM_096149,661
gen.XM_096155,5967
gen.XM_096156,5968
gen.XM_096169,1022
gen.XM_096172,787
gen.XM_096195,1190
gen.XM_096198,1117
gen.XM_096203,1464
gen.XM_096303,6256
gen.XM_096486,3315
gen.XM_096520,3165
gen.XM_096544,3119
gen.XM_096566,3680
gen.XM_096572,3819
gen.XM_096597,3739
gen.XM_096606,3608
gen.XM_096620,3578
gen.XM_096630,3486
gen.XM_096661,3441
gen.XM_096744,4034
gen.XM_096772,3966
gen.XM_096842,4245
gen.XM_096844,4286
gen.XM_097043,4984
gen.XM_097193,5001
gen.XM_097195,5000
gen.XM_097204,4754
gen.XM_097232,5048
gen.XM_097274,5510
gen.XM_097275,5521
gen.XM_097300,5222
gen.XM_097365,5440
gen.XM_097420,5134
gen.XM_097453,2068
gen.XM_097519,561
gen.XM_097565,249
gen.XM_097639,352
gen.XM_097649,198
gen.XM_097713,5800
gen.XM_097727,5773
gen.XM_097731,5795
gen.XM_097749,5644
gen.XM_097772,5731

gen.XM_097807,5929
gen.XM_097817,5925
gen.XM_097833,5950
gen.XM_097886,5971
gen.XM_097976,715
gen.XM_098004,729
gen.XM_098047,962
gen.XM_098048,960
gen.XM_098109,1345
gen.XM_098111,1245
gen.XM_098154,1232
gen.XM_098158,1103
gen.XM_098173,1227
gen.XM_098248,1384
gen.XM_098351,1609
gen.XM_098352,1611
gen.XM_098354,1610
gen.XM_098362,1634
gen.XM_098387,1778
gen.XM_098405,1534
gen.XM_098468,2108
gen.XM_098599,619
gen.XM_098654,2447
gen.XM_098669,2466
gen.XM_098747,2582
gen.XM_098761,2564
gen.XM_098913,2843
gen.XM_098943,2725
gen.XM_098995,6302
gen.XM_099467,363
gen.XM_102377,4432
gen.XM_103946,665
gen.XM_104983,6263
gen.XM_105236,1289
gen.XM_105658,1325
gen.XM_106246,1520
gen.XM_106739,1562
gen.XM_107825,2225
gen.XM_109162,3075
gen.XM_113223,3268
gen.XM_113224,3275
gen.XM_113226,3400
gen.XM_113229,3366
gen.XM_113230,3363
gen.XM_113238,3152
gen.XM_113266,4202
gen.XM_113268,4207
gen.XM_113291,4429
gen.XM_113293,4467
gen.XM_113299,4504
gen.XM_113303,5013
gen.XM_113310,4723
gen.XM_113315,4944
gen.XM_113324,4674
gen.XM_113325,4703
gen.XM_113328,4695

gen.XM_113330,5011
gen.XM_113334,4819
gen.XM_113343,5028
gen.XM_113348,5316
gen.XM_113352,5294
gen.XM_113360,386
gen.XM_113361,598
gen.XM_113369,361
gen.XM_113374,140
gen.XM_113379,473
gen.XM_113380,5749
gen.XM_113390,929
gen.XM_113395,1193
gen.XM_113397,1244
gen.XM_113405,1140
gen.XM_113408,1296
gen.XM_113409,1202
gen.XM_113410,1088
gen.XM_113417,1254
gen.XM_113422,1329
gen.XM_113425,1452
gen.XM_113452,1556
gen.XM_113454,1841
gen.XM_113463,1654
gen.XM_113467,1720
gen.XM_113468,1845
gen.XM_113476,1860
gen.XM_113531,2526
gen.XM_113532,2627
gen.XM_113540,2548
gen.XM_113557,2493
gen.XM_113564,2846
gen.XM_113585,6122
gen.XM_113615,2927
gen.XM_113702,3862
gen.XM_113712,3635
gen.XM_113719,3560
gen.XM_113726,3584
gen.XM_113730,3519
gen.XM_113737,3855
gen.XM_113739,3437
gen.XM_113752,3946
gen.XM_113759,4105
gen.XM_113823,4163
gen.XM_113836,4326
gen.XM_113840,4608
gen.XM_113843,4420
gen.XM_113845,4418
gen.XM_113853,4570
gen.XM_113855,4560
gen.XM_113874,4431
gen.XM_113876,4426
gen.XM_113882,4640
gen.XM_113892,4978
gen.XM_113901,4653
gen.XM_113919,4905

gen.XM_113929,4696
gen.XM_113931,4706
gen.XM_113938,4824
gen.XM_113943,5010
gen.XM_113945,4998
gen.XM_113951,4962
gen.XM_113988,5229
gen.XM_114004,5349
gen.XM_114018,5097
gen.XM_114024,5560
gen.XM_114025,5530
gen.XM_114027,5366
gen.XM_114030,560
gen.XM_114044,129
gen.XM_114055,384
gen.XM_114062,3
gen.XM_114097,376
gen.XM_114098,360
gen.XM_114109,525
gen.XM_114125,259
gen.XM_114137,634
gen.XM_114153,484
gen.XM_114154,5875
gen.XM_114163,5794
gen.XM_114165,5813
gen.XM_114174,5673
gen.XM_114178,5706
gen.XM_114185,5889
gen.XM_114209,6024
gen.XM_114215,816
gen.XM_114229,838
gen.XM_114247,824
gen.XM_114266,851
gen.XM_114267,856
gen.XM_114298,957
gen.XM_114301,1225
gen.XM_114309,1242
gen.XM_114323,1141
gen.XM_114328,1344
gen.XM_114356,1288
gen.XM_114364,1122
gen.XM_114368,1510
gen.XM_114401,1496
gen.XM_114424,1473
gen.XM_114426,1470
gen.XM_114434,1555
gen.XM_114435,1552
gen.XM_114437,1567
gen.XM_114439,1586
gen.XM_114440,1587
gen.XM_114442,1584
gen.XM_114453,1819
gen.XM_114457,1817
gen.XM_114469,1623
gen.XM_114482,1683
gen.XM_114492,2106

gen.XM_114497,2058
gen.XM_114555,2429
gen.XM_114578,2444
gen.XM_114602,2404
gen.XM_114613,2625
gen.XM_114617,2517
gen.XM_114618,2523
gen.XM_114640,2556
gen.XM_114646,2756
gen.XM_114649,2873
gen.XM_114655,2854
gen.XM_114661,2677
gen.XM_114662,2688
gen.XM_114669,2845
gen.XM_114677,2802
gen.XM_114678,2801
gen.XM_114679,2799
gen.XM_114686,2699
gen.XM_114692,6354
gen.XM_114708,6291
gen.XM_114720,6130
gen.XM_114724,6119
gen.XM_114798,233
gen.XM_114862,3104
gen.XM_114894,2977
gen.XM_114981,3139
gen.XM_115031,3286
gen.XM_115062,3364
gen.XM_115063,3365
gen.XM_115081,3177
gen.XM_115117,3570
gen.XM_115140,3634
gen.XM_115197,3809
gen.XM_115215,3948
gen.XM_115352,4333
gen.XM_115480,4910
gen.XM_115603,5466
gen.XM_115615,5395
gen.XM_115672,869
gen.XM_115706,1039
gen.XM_115722,1040
gen.XM_115825,1002
gen.XM_115846,5691
gen.XM_115874,6281
gen.XM_115886,6131
gen.XM_115890,6136
gen.XM_115923,6259
gen.XM_115924,6121
gen.XM_116034,1338
gen.XM_116058,1295
gen.XM_116071,1204
gen.XM_116072,1205
gen.XM_116204,1532
gen.XM_116205,1533
gen.XM_116247,1484
gen.XM_116285,1408

gen.XM_116307,1691
gen.XM_116340,1807
gen.XM_116365,1856
gen.XM_116427,1648
gen.XM_116439,1593
gen.XM_116447,1606
gen.XM_116465,1716
gen.XM_116511,1857
gen.XM_116514,1861
gen.XM_116524,2140
gen.XM_116806,2789
gen.XM_116818,2738
gen.XM_116853,1139
gen.XM_116856,1810
gen.XM_116863,2975
gen.XM_116913,3845
gen.XM_116926,3451
gen.XM_117061,4913
gen.XM_117066,4768
gen.XM_117096,5084
gen.XM_117118,5379
gen.XM_117122,5183
gen.XM_117128,5605
gen.XM_117159,2
gen.XM_117181,534
gen.XM_117184,163
gen.XM_117185,582
gen.XM_117196,641
gen.XM_117209,5688
gen.XM_117264,736
gen.XM_117311,1337
gen.XM_117351,1412
gen.XM_117387,1622
gen.XM_117398,1641
gen.XM_117444,2471
gen.XM_117449,2160
gen.XM_117452,2472
gen.XM_117481,2406
gen.XM_117487,2622
gen.XM_117519,2874
gen.XM_117539,6352
gen.XM_117555,6349
gen.XM_117692,28
gen.XM_118637,4251
gen.XM_165390,3427
gen.XM_165410,4583
gen.XM_165411,4413
gen.XM_165418,4713
gen.XM_165421,4701
gen.XM_165422,4704
gen.XM_165432,5541
gen.XM_165438,144
gen.XM_165439,620
gen.XM_165442,59
gen.XM_165443,477
gen.XM_165448,723

gen.XM_165451,1268
gen.XM_165465,1531
gen.XM_165470,1528
gen.XM_165473,1482
gen.XM_165483,1818
gen.XM_165484,1820
gen.XM_165488,1615
gen.XM_165499,2057
gen.XM_165514,2579
gen.XM_165530,6355
gen.XM_165533,6235
gen.XM_165551,2913
gen.XM_165555,2889
gen.XM_165557,2897
gen.XM_165560,2925
gen.XM_165563,2926
gen.XM_165567,2921
gen.XM_165571,3407
gen.XM_165584,3414
gen.XM_165586,3413
gen.XM_165592,3401
gen.XM_165598,3303
gen.XM_165600,3310
gen.XM_165610,3222
gen.XM_165611,3217
gen.XM_165612,3223
gen.XM_165616,3325
gen.XM_165627,3335
gen.XM_165628,3341
gen.XM_165631,3328
gen.XM_165636,3903
gen.XM_165639,3917
gen.XM_165645,4534
gen.XM_165647,4528
gen.XM_165648,4537
gen.XM_165649,4527
gen.XM_165656,4484
gen.XM_165657,4493
gen.XM_165658,4489
gen.XM_165669,2091
gen.XM_165692,2159
gen.XM_165698,1949
gen.XM_165717,1954
gen.XM_165728,2036
gen.XM_165738,1999
gen.XM_165740,1865
gen.XM_165743,1937
gen.XM_165747,1948
gen.XM_165749,2037
gen.XM_165758,2013
gen.XM_165764,2011
gen.XM_165765,1988
gen.XM_165770,1951
gen.XM_165771,1983
gen.XM_165772,1876
gen.XM_165777,2044

gen.XM_165794,1921   gen.XM_166177,3406
gen.XM_165799,2006   gen.XM_166181,3403
gen.XM_165801,1956   gen.XM_166196,3308
gen.XM_165809,2016   gen.XM_166232,3227
gen.XM_165836,2350   gen.XM_166234,3224
gen.XM_165839,2346   gen.XM_166235,3293
gen.XM_165841,2197   gen.XM_166236,3294
gen.XM_165860,2167   gen.XM_166239,3349
gen.XM_165867,2249   gen.XM_166253,3336
gen.XM_165870,2245   gen.XM_166266,3904
gen.XM_165872,2253   gen.XM_166273,3886
gen.XM_165876,2258   gen.XM_166277,4532
gen.XM_165877,2240   gen.XM_166282,4491
gen.XM_165882,2248   gen.XM_166285,4490
gen.XM_165888,2934   gen.XM_166288,5071
gen.XM_165890,2929   gen.XM_166303,2092
gen.XM_165891,2941   gen.XM_166310,2101
gen.XM_165903,3633   gen.XM_166327,2157
gen.XM_165905,3579   gen.XM_166333,1932
gen.XM_165906,3532   gen.XM_166336,2021
gen.XM_165910,3465   gen.XM_166340,1882
gen.XM_165921,4127   gen.XM_166349,1872
gen.XM_165923,4325   gen.XM_166353,2002
gen.XM_165954,5026   gen.XM_166357,2049
gen.XM_165960,5347   gen.XM_166360,1938
gen.XM_165963,5367   gen.XM_166361,2009
gen.XM_165975,327   gen.XM_166362,1884
gen.XM_165976,373   gen.XM_166363,1940
gen.XM_165977,264   gen.XM_166376,2004
gen.XM_165978,532   gen.XM_166381,1992
gen.XM_165981,290   gen.XM_166392,2019
gen.XM_165983,275   gen.XM_166401,1995
gen.XM_165984,175   gen.XM_166402,1896
gen.XM_165994,927   gen.XM_166406,2015
gen.XM_165998,893   gen.XM_166412,1910
gen.XM_166007,910   gen.XM_166417,1914
gen.XM_166008,900   gen.XM_166419,1920
gen.XM_166011,1121   gen.XM_166425,1888
gen.XM_166014,1275   gen.XM_166446,2042
gen.XM_166015,1192   gen.XM_166457,1878
gen.XM_166017,1350   gen.XM_166459,1931
gen.XM_166026,1669   gen.XM_166469,1879
gen.XM_166027,1663   gen.XM_166480,1955
gen.XM_166028,1842   gen.XM_166482,2351
gen.XM_166029,1802   gen.XM_166485,2353
gen.XM_166037,1612   gen.XM_166494,2224
gen.XM_166042,2054   gen.XM_166504,2222
gen.XM_166049,2147   gen.XM_166505,2202
gen.XM_166063,2540   gen.XM_166506,2200
gen.XM_166064,2558   gen.XM_166509,2219
gen.XM_166078,6142   gen.XM_166512,2205
gen.XM_166081,6255   gen.XM_166513,2220
gen.XM_166093,2984   gen.XM_166514,2203
gen.XM_166125,2966   gen.XM_166515,2204
gen.XM_166157,2922   gen.XM_166521,2198
gen.XM_166174,3409   gen.XM_166523,2170

gen.XM_166531,2190
gen.XM_166540,2191
gen.XM_166541,2168
gen.XM_166594,2230
gen.XM_166599,20
gen.XM_166605,3506
gen.XM_166629,2988
gen.XM_166665,2918
gen.XM_166717,2906
gen.XM_166743,3418
gen.XM_167008,5080
gen.XM_167016,2087
gen.XM_167027,2094
gen.XM_167037,2096
gen.XM_167046,2150
gen.XM_167128,2023
gen.XM_167161,2025
gen.XM_167169,1868
gen.XM_167179,2031
gen.XM_167196,2041
gen.XM_167225,2047
gen.XM_167339,2264
gen.XM_167363,5065
gen.XM_167366,1209
gen.XM_167374,2898
gen.XM_167395,2963
gen.XM_167411,2901
gen.XM_167414,2904
gen.XM_167433,3324
gen.XM_167437,3192
gen.XM_167439,3876
gen.XM_167453,4538
gen.XM_167456,4541
gen.XM_167476,2321
gen.XM_167477,2325
gen.XM_167483,2328
gen.XM_167484,2329
gen.XM_167494,2273
gen.XM_167498,2301
gen.XM_167500,2299
gen.XM_167502,2312
gen.XM_167504,2300
gen.XM_167518,3754
gen.XM_167530,5529
gen.XM_167538,5945
gen.XM_167558,2645
gen.XM_167626,2887
gen.XM_167716,3244
gen.XM_167726,3248
gen.XM_167747,3234
gen.XM_167748,3228
gen.XM_167780,3417
gen.XM_167804,3291
gen.XM_167853,3318
gen.XM_167892,3883
gen.XM_167906,3877

gen.XM_167911,3868
gen.XM_167918,3869
gen.XM_168054,2103
gen.XM_168070,1928
gen.XM_168104,1994
gen.XM_168123,1877
gen.XM_168181,2322
gen.XM_168251,2323
gen.XM_168354,2271
gen.XM_168378,2269
gen.XM_168435,2316
gen.XM_168450,2315
gen.XM_168454,2302
gen.XM_168461,2311
gen.XM_168464,2317
gen.XM_168470,2310
gen.XM_168548,2375
gen.XM_168572,2380
gen.XM_168586,2360
gen.XM_169414,3880
gen.XM_169540,5078
gen.XM_170195,2267
gen.XM_170427,2318

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

I.   Definitions

The terms "TAT polypeptide" and "TAT" as used herein and when immediately followed by a numerical designation, refer to various polypeptides, wherein the complete designation (i.e., TAT/number) refers to specific polypeptide sequences as described herein. The terms "TAT/number polypeptide" and "TAT/number" wherein the term "number" is provided as an actual numerical designation as used herein encompass native sequence polypeptides, polypeptide variants and fragments of native sequence polypeptides and polypeptide variants (which are further defined herein). The TAT polypeptides described herein may be isolated from a variety of sources, such as from human tissue types or from another source, or prepared by recombinant or synthetic methods. The term "TAT polypeptide" refers to each individual TAT/number polypeptide disclosed herein. All disclosures in this specification which refer to the "TAT polypeptide" refer to each of the polypeptides individually as well as jointly. For example, descriptions of the preparation of, purification of, derivation of, formation of antibodies to or against, formation of TAT binding oligopeptides to or against, formation of TAT binding organic molecules to or against, administration of, compositions containing, treatment of a disease with, etc., pertain to each polypeptide of the invention individually. The term "TAT polypeptide" also includes variants of the TAT/number polypeptides disclosed herein.

A "native sequence TAT polypeptide" comprises a polypeptide having the same amino acid sequence as the corresponding TAT polypeptide derived from nature. Such native sequence TAT polypeptides can be isolated from nature or can be produced by recombinant or synthetic means. The term "native sequence TAT polypeptide" specifically encompasses naturally-occurring truncated or secreted forms of the specific TAT polypeptide (e.g., an extracellular domain sequence), naturally-occurring variant forms (e.g., alternatively spliced forms) and naturally-occurring allelic variants of the polypeptide. In certain embodiments of the invention, the native sequence TAT polypeptides disclosed herein are mature or full-length native sequence polypeptides comprising the full-length amino acids sequences shown in the accompanying figures. Start and stop codons (if indicated) are shown in bold font and underlined in the figures. Nucleic acid residues indicated as "N" in the accompanying figures are any nucleic acid residue. However, while the TAT polypeptides disclosed in the accompanying figures are shown to begin with methionine residues designated herein as amino acid position 1 in the figures, it is conceivable and possible that other methionine residues located either upstream or downstream from the amino acid position 1 in the figures may be employed as the starting amino acid residue for the TAT polypeptides.

The TAT polypeptide "extracellular domain" or "ECD" refers to a form of the TAT polypeptide which is essentially free of the transmembrane and cytoplasmic domains. Ordinarily, a TAT polypeptide ECD will have less than 1% of such transmembrane and/or cytoplasmic domains and preferably, will have less than 0.5% of such domains. It will be understood that any transmembrane domains identified for the TAT polypeptides of the present invention are identified pursuant to criteria routinely employed in the art for identifying that type of hydrophobic domain. The exact boundaries of a transmembrane domain may vary but most likely by no more than about 5 amino acids at either end of the domain as initially identified herein. Optionally, therefore, an

229

extracellular domain of a TAT polypeptide may contain from about 5 or fewer amino acids on either side of the transmembrane domain/extracellular domain boundary as identified in the Examples or specification and such polypeptides, with or without the associated signal peptide, and nucleic acid encoding them, are contemplated by the present invention.

The approximate location of the "signal peptides" of the various TAT polypeptides disclosed herein may be shown in the present specification and/or the accompanying figures. It is noted, however, that the C-terminal boundary of a signal peptide may vary, but most likely by no more than about 5 amino acids on either side of the signal peptide C-terminal boundary as initially identified herein, wherein the C-terminal boundary of the signal peptide may be identified pursuant to criteria routinely employed in the art for identifying that type of amino acid sequence element (e.g., Nielsen et al., Prot. Eng. 10:1-6 (1997) and von Heinje et al., Nucl. Acids. Res. 14:4683-4690 (1986)). Moreover, it is also recognized that, in some cases, cleavage of a signal sequence from a secreted polypeptide is not entirely uniform, resulting in more than one secreted species. These mature polypeptides, where the signal peptide is cleaved within no more than about 5 amino acids on either side of the C-terminal boundary of the signal peptide as identified herein, and the polynucleotides encoding them, are contemplated by the present invention.

"TAT polypeptide variant" means a TAT polypeptide, preferably an active TAT polypeptide, as defined herein having at least about 80% amino acid sequence identity with a full-length native sequence TAT polypeptide sequence as disclosed herein, a TAT polypeptide sequence lacking the signal peptide as disclosed herein, an extracellular domain of a TAT polypeptide, with or without the signal peptide, as disclosed herein or any other fragment of a full-length TAT polypeptide sequence as disclosed herein (such as those encoded by a nucleic acid that represents only a portion of the complete coding sequence for a full-length TAT polypeptide). Such TAT polypeptide variants include, for instance, TAT polypeptides wherein one or more amino acid residues are added, or deleted, at the N– or C-terminus of the full-length native amino acid sequence. Ordinarily, a TAT polypeptide variant will have at least about 80% amino acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% amino acid sequence identity, to a full-length native sequence TAT polypeptide sequence as disclosed herein, a TAT polypeptide sequence lacking the signal peptide as disclosed herein, an extracellular domain of a TAT polypeptide, with or without the signal peptide, as disclosed herein or any other specifically defined fragment of a full-length TAT polypeptide sequence as disclosed herein. Ordinarily, TAT variant polypeptides are at least about 10 amino acids in length, alternatively at least about 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600 amino acids in length, or more. Optionally, TAT variant polypeptides will have no more than one conservative amino acid substitution as compared to the native TAT polypeptide sequence, alternatively no more than 2, 3, 4, 5, 6, 7, 8, 9, or 10 conservative amino acid substitution as compared to the native TAT polypeptide sequence.

"Percent (%) amino acid sequence identity" with respect to the TAT polypeptide sequences identified

herein is defined as the percentage of amino acid residues in a candidate sequence that are identical with the amino acid residues in the specific TAT polypeptide sequence, after aligning the sequences and introducing gaps, if necessary, to achieve the maximum percent sequence identity, and not considering any conservative substitutions as part of the sequence identity. Alignment for purposes of determining percent amino acid

5   sequence identity can be achieved in various ways that are within the skill in the art, for instance, using publicly available computer software such as BLAST, BLAST-2, ALIGN or Megalign (DNASTAR) software. Those skilled in the art can determine appropriate parameters for measuring alignment, including any algorithms needed to achieve maximal alignment over the full length of the sequences being compared. For purposes herein, however, % amino acid sequence identity values are generated using the sequence comparison computer program ALIGN-2, wherein the complete source code for the ALIGN-2 program is provided in Table 1 below.

10   The ALIGN-2 sequence comparison computer program was authored by Genentech, Inc. and the source code shown in Table 1 below has been filed with user documentation in the U.S. Copyright Office, Washington D.C., 20559, where it is registered under U.S. Copyright Registration No. TXU510087. The ALIGN-2 program is publicly available through Genentech, Inc., South San Francisco, California or may be compiled from the source code provided in Table 1 below. The ALIGN-2 program should be compiled for use on a UNIX operating

15   system, preferably digital UNIX V4.0D. All sequence comparison parameters are set by the ALIGN-2 program and do not vary.

In situations where ALIGN-2 is employed for amino acid sequence comparisons, the % amino acid sequence identity of a given amino acid sequence A to, with, or against a given amino acid sequence B (which can alternatively be phrased as a given amino acid sequence A that has or comprises a certain % amino acid

20   sequence identity to, with, or against a given amino acid sequence B) is calculated as follows:

$$100 \text{ times the fraction } X/Y$$

where X is the number of amino acid residues scored as identical matches by the sequence alignment program

25   ALIGN-2 in that program's alignment of A and B, and where Y is the total number of amino acid residues in B. It will be appreciated that where the length of amino acid sequence A is not equal to the length of amino acid sequence B, the % amino acid sequence identity of A to B will not equal the % amino acid sequence identity of B to A. As examples of % amino acid sequence identity calculations using this method, Tables 2 and 3 demonstrate how to calculate the % amino acid sequence identity of the amino acid sequence designated

30   "Comparison Protein" to the amino acid sequence designated "TAT", wherein "TAT" represents the amino acid sequence of a hypothetical TAT polypeptide of interest, "Comparison Protein" represents the amino acid sequence of a polypeptide against which the "TAT" polypeptide of interest is being compared, and "X, "Y" and "Z" each represent different hypothetical amino acid residues. Unless specifically stated otherwise, all % amino acid sequence identity values used herein are obtained as described in the immediately preceding paragraph using

35   the ALIGN-2 computer program.

"TAT variant polynucleotide" or "TAT variant nucleic acid sequence" means a nucleic acid molecule

which encodes a TAT polypeptide, preferably an active TAT polypeptide, as defined herein and which has at least about 80% nucleic acid sequence identity with a nucleotide acid sequence encoding a full-length native sequence TAT polypeptide sequence as disclosed herein, a full-length native sequence TAT polypeptide sequence lacking the signal peptide as disclosed herein, an extracellular domain of a TAT polypeptide, with or without the signal peptide, as disclosed herein or any other fragment of a full-length TAT polypeptide sequence as disclosed herein (such as those encoded by a nucleic acid that represents only a portion of the complete coding sequence for a full-length TAT polypeptide). Ordinarily, a TAT variant polynucleotide will have at least about 80% nucleic acid sequence identity, alternatively at least about 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% nucleic acid sequence identity with a nucleic acid sequence encoding a full-length native sequence TAT polypeptide sequence as disclosed herein, a full-length native sequence TAT polypeptide sequence lacking the signal peptide as disclosed herein, an extracellular domain of a TAT polypeptide, with or without the signal sequence, as disclosed herein or any other fragment of a full-length TAT polypeptide sequence as disclosed herein. Variants do not encompass the native nucleotide sequence.

Ordinarily, TAT variant polynucleotides are at least about 5 nucleotides in length, alternatively at least about 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, or 1000 nucleotides in length, wherein in this context the term "about" means the referenced nucleotide sequence length plus or minus 10% of that referenced length.

"Percent (%) nucleic acid sequence identity" with respect to TAT-encoding nucleic acid sequences identified herein is defined as the percentage of nucleotides in a candidate sequence that are identical with the nucleotides in the TAT nucleic acid sequence of interest, after aligning the sequences and introducing gaps, if necessary, to achieve the maximum percent sequence identity. Alignment for purposes of determining percent nucleic acid sequence identity can be achieved in various ways that are within the skill in the art, for instance, using publicly available computer software such as BLAST, BLAST-2, ALIGN or Megalign (DNASTAR) software. For purposes herein, however, % nucleic acid sequence identity values are generated using the sequence comparison computer program ALIGN-2, wherein the complete source code for the ALIGN-2 program is provided in Table 1 below. The ALIGN-2 sequence comparison computer program was authored by Genentech, Inc. and the source code shown in Table 1 below has been filed with user documentation in the U.S. Copyright Office, Washington D.C., 20559, where it is registered under U.S. Copyright Registration No. TXU510087. The ALIGN-2 program is publicly available through Genentech, Inc., South San Francisco, California or may be compiled from the source code provided in Table 1 below. The ALIGN-2 program should be compiled for use on a UNIX operating system, preferably digital UNIX V4.0D. All sequence comparison

232

parameters are set by the ALIGN-2 program and do not vary.

In situations where ALIGN-2 is employed for nucleic acid sequence comparisons, the % nucleic acid sequence identity of a given nucleic acid sequence C to, with, or against a given nucleic acid sequence D (which can alternatively be phrased as a given nucleic acid sequence C that has or comprises a certain % nucleic acid sequence identity to, with, or against a given nucleic acid sequence D) is calculated as follows:

5

100 times the fraction W/Z

where W is the number of nucleotides scored as identical matches by the sequence alignment program ALIGN-2 in that program's alignment of C and D, and where Z is the total number of nucleotides in D. It will be
10   appreciated that where the length of nucleic acid sequence C is not equal to the length of nucleic acid sequence D, the % nucleic acid sequence identity of C to D will not equal the % nucleic acid sequence identity of D to C. As examples of % nucleic acid sequence identity calculations, Tables 4 and 5, demonstrate how to calculate the % nucleic acid sequence identity of the nucleic acid sequence designated "Comparison DNA" to the nucleic acid sequence designated "TAT-DNA", wherein "TAT-DNA" represents a hypothetical TAT-encoding nucleic
15   acid sequence of interest, "Comparison DNA" represents the nucleotide sequence of a nucleic acid molecule against which the "TAT-DNA" nucleic acid molecule of interest is being compared, and "N", "L" and "V" each represent different hypothetical nucleotides. Unless specifically stated otherwise, all % nucleic acid sequence identity values used herein are obtained as described in the immediately preceding paragraph using the ALIGN-2 computer program.

20   In other embodiments, TAT variant polynucleotides are nucleic acid molecules that encode a TAT polypeptide and which are capable of hybridizing, preferably under stringent hybridization and wash conditions, to nucleotide sequences encoding a full-length TAT polypeptide as disclosed herein. TAT variant polypeptides may be those that are encoded by a TAT variant polynucleotide.

The term "full-length coding region" when used in reference to a nucleic acid encoding a TAT
25   polypeptide refers to the sequence of nucleotides which encode the full-length TAT polypeptide of the invention (which is often shown between start and stop codons, inclusive thereof, in the accompanying figures). The term "full-length coding region" when used in reference to an ATCC deposited nucleic acid refers to the TAT polypeptide-encoding portion of the cDNA that is inserted into the vector deposited with the ATCC (which is often shown between start and stop codons, inclusive thereof, in the accompanying figures).

30   "Isolated," when used to describe the various TAT polypeptides disclosed herein, means polypeptide that has been identified and separated and/or recovered from a component of its natural environment. Contaminant components of its natural environment are materials that would typically interfere with diagnostic or therapeutic uses for the polypeptide, and may include enzymes, hormones, and other proteinaceous or non-proteinaceous solutes. In preferred embodiments, the polypeptide will be purified (1) to a degree sufficient to
35   obtain at least 15 residues of N-terminal or internal amino acid sequence by use of a spinning cup sequenator, or (2) to homogeneity by SDS-PAGE under non-reducing or reducing conditions using Coomassie blue or,

233

preferably, silver stain. Isolated polypeptide includes polypeptide *in situ* within recombinant cells, since at least one component of the TAT polypeptide natural environment will not be present. Ordinarily, however, isolated polypeptide will be prepared by at least one purification step.

An "isolated" TAT polypeptide-encoding nucleic acid or other polypeptide-encoding nucleic acid is a nucleic acid molecule that is identified and separated from at least one contaminant nucleic acid molecule with which it is ordinarily associated in the natural source of the polypeptide-encoding nucleic acid. An isolated polypeptide-encoding nucleic acid molecule is other than in the form or setting in which it is found in nature. Isolated polypeptide-encoding nucleic acid molecules therefore are distinguished from the specific polypeptide-encoding nucleic acid molecule as it exists in natural cells. However, an isolated polypeptide-encoding nucleic acid molecule includes polypeptide-encoding nucleic acid molecules contained in cells that ordinarily express the polypeptide where, for example, the nucleic acid molecule is in a chromosomal location different from that of natural cells.

The term "control sequences" refers to DNA sequences necessary for the expression of an operably linked coding sequence in a particular host organism. The control sequences that are suitable for prokaryotes, for example, include a promoter, optionally an operator sequence, and a ribosome binding site. Eukaryotic cells are known to utilize promoters, polyadenylation signals, and enhancers.

Nucleic acid is "operably linked" when it is placed into a functional relationship with another nucleic acid sequence. For example, DNA for a presequence or secretory leader is operably linked to DNA for a polypeptide if it is expressed as a preprotein that participates in the secretion of the polypeptide; a promoter or enhancer is operably linked to a coding sequence if it affects the transcription of the sequence; or a ribosome binding site is operably linked to a coding sequence if it is positioned so as to facilitate translation. Generally, "operably linked" means that the DNA sequences being linked are contiguous, and, in the case of a secretory leader, contiguous and in reading phase. However, enhancers do not have to be contiguous. Linking is accomplished by ligation at convenient restriction sites. If such sites do not exist, the synthetic oligonucleotide adaptors or linkers are used in accordance with conventional practice.

"Stringency" of hybridization reactions is readily determinable by one of ordinary skill in the art, and generally is an empirical calculation dependent upon probe length, washing temperature, and salt concentration. In general, longer probes require higher temperatures for proper annealing, while shorter probes need lower temperatures. Hybridization generally depends on the ability of denatured DNA to reanneal when complementary strands are present in an environment below their melting temperature. The higher the degree of desired homology between the probe and hybridizable sequence, the higher the relative temperature which can be used. As a result, it follows that higher relative temperatures would tend to make the reaction conditions more stringent, while lower temperatures less so. For additional details and explanation of stringency of hybridization reactions, see Ausubel et al., Current Protocols in Molecular Biology, Wiley Interscience Publishers, (1995).

"Stringent conditions" or "high stringency conditions", as defined herein, may be identified by those that: (1) employ low ionic strength and high temperature for washing, for example 0.015 M sodium

234

chloride/0.0015 M sodium citrate/0.1% sodium dodecyl sulfate at 50°C; (2) employ during hybridization a denaturing agent, such as formamide, for example, 50% (v/v) formamide with 0.1% bovine serum albumin/0.1% Ficoll/0.1% polyvinylpyrrolidone/50mM sodium phosphate buffer at pH 6.5 with 750 mM sodium chloride, 75 mM sodium citrate at 42°C; or (3) overnight hybridization in a solution that employs 50% formamide, 5 x SSC (0.75 M NaCl, 0.075 M sodium citrate), 50 mM sodium phosphate (pH 6.8), 0.1% sodium pyrophosphate, 5 x Denhardt's solution, sonicated salmon sperm DNA (50 μg/ml), 0.1% SDS, and 10% dextran sulfate at 42°C, with a 10 minute wash at 42°C in 0.2 x SSC (sodium chloride/sodium citrate) followed by a 10 minute high-stringency wash consisting of 0.1 x SSC containing EDTA at 55°C.

"Moderately stringent conditions" may be identified as described by Sambrook et al., Molecular Cloning: A Laboratory Manual, New York: Cold Spring Harbor Press, 1989, and include the use of washing solution and hybridization conditions (e.g., temperature, ionic strength and %SDS) less stringent that those described above. An example of moderately stringent conditions is overnight incubation at 37°C in a solution comprising: 20% formamide, 5 x SSC (150 mM NaCl, 15 mM trisodium citrate), 50 mM sodium phosphate (pH 7.6), 5 x Denhardt's solution, 10% dextran sulfate, and 20 mg/ml denatured sheared salmon sperm DNA, followed by washing the filters in 1 x SSC at about 37-50°C. The skilled artisan will recognize how to adjust the temperature, ionic strength, etc. as necessary to accommodate factors such as probe length and the like.

The term "epitope tagged" when used herein refers to a chimeric polypeptide comprising a TAT polypeptide or anti-TAT antibody fused to a "tag polypeptide". The tag polypeptide has enough residues to provide an epitope against which an antibody can be made, yet is short enough such that it does not interfere with activity of the polypeptide to which it is fused. The tag polypeptide preferably also is fairly unique so that the antibody does not substantially cross-react with other epitopes. Suitable tag polypeptides generally have at least six amino acid residues and usually between about 8 and 50 amino acid residues (preferably, between about 10 and 20 amino acid residues).

"Active" or "activity" for the purposes herein refers to form(s) of a TAT polypeptide which retain a biological and/or an immunological activity of native or naturally-occurring TAT, wherein "biological" activity refers to a biological function (either inhibitory or stimulatory) caused by a native or naturally-occurring TAT other than the ability to induce the production of an antibody against an antigenic epitope possessed by a native or naturally-occurring TAT and an "immunological" activity refers to the ability to induce the production of an antibody against an antigenic epitope possessed by a native or naturally-occurring TAT.

The term "antagonist" is used in the broadest sense, and includes any molecule that partially or fully blocks, inhibits, or neutralizes a biological activity of a native TAT polypeptide disclosed herein. In a similar manner, the term "agonist" is used in the broadest sense and includes any molecule that mimics a biological activity of a native TAT polypeptide disclosed herein. Suitable agonist or antagonist molecules specifically include agonist or antagonist antibodies or antibody fragments, fragments or amino acid sequence variants of native TAT polypeptides, peptides, antisense oligonucleotides, small organic molecules, etc. Methods for identifying agonists or antagonists of a TAT polypeptide may comprise contacting a TAT polypeptide with a candidate agonist or antagonist molecule and measuring a detectable change in one or more biological activities

235

normally associated with the TAT polypeptide.

"Treating" or "treatment" or "alleviation" refers to both therapeutic treatment and prophylactic or preventative measures, wherein the object is to prevent or slow down (lessen) the targeted pathologic condition or disorder. Those in need of treatment include those already with the disorder as well as those prone to have the disorder or those in whom the disorder is to be prevented. A subject or mammal is successfully "treated" for a TAT polypeptide-expressing cancer if, after receiving a therapeutic amount of an anti-TAT antibody, TAT binding oligopeptide or TAT binding organic molecule according to the methods of the present invention, the patient shows observable and/or measurable reduction in or absence of one or more of the following: reduction in the number of cancer cells or absence of the cancer cells; reduction in the tumor size; inhibition (i.e., slow to some extent and preferably stop) of cancer cell infiltration into peripheral organs including the spread of cancer into soft tissue and bone; inhibition (i.e., slow to some extent and preferably stop) of tumor metastasis; inhibition, to some extent, of tumor growth; and/or relief to some extent, one or more of the symptoms associated with the specific cancer; reduced morbidity and mortality, and improvement in quality of life issues. To the extent the anti-TAT antibody or TAT binding oligopeptide may prevent growth and/or kill existing cancer cells, it may be cytostatic and/or cytotoxic. Reduction of these signs or symptoms may also be felt by the patient.

The above parameters for assessing successful treatment and improvement in the disease are readily measurable by routine procedures familiar to a physician. For cancer therapy, efficacy can be measured, for example, by assessing the time to disease progression (TTP) and/or determining the response rate (RR). Metastasis can be determined by staging tests and by bone scan and tests for calcium level and other enzymes to determine spread to the bone. CT scans can also be done to look for spread to the pelvis and lymph nodes in the area. Chest X-rays and measurement of liver enzyme levels by known methods are used to look for metastasis to the lungs and liver, respectively. Other routine methods for monitoring the disease include transrectal ultrasonography (TRUS) and transrectal needle biopsy (TRNB).

For bladder cancer, which is a more localized cancer, methods to determine progress of disease include urinary cytologic evaluation by cystoscopy, monitoring for presence of blood in the urine, visualization of the urothelial tract by sonography or an intravenous pyelogram, computed tomography (CT) and magnetic resonance imaging (MRI). The presence of distant metastases can be assessed by CT of the abdomen, chest x-rays, or radionuclide imaging of the skeleton.

"Chronic" administration refers to administration of the agent(s) in a continuous mode as opposed to an acute mode, so as to maintain the initial therapeutic effect (activity) for an extended period of time. "Intermittent" administration is treatment that is not consecutively done without interruption, but rather is cyclic in nature.

"Mammal" for purposes of the treatment of, alleviating the symptoms of or diagnosis of a cancer refers to any animal classified as a mammal, including humans, domestic and farm animals, and zoo, sports, or pet animals, such as dogs, cats, cattle, horses, sheep, pigs, goats, rabbits, etc. Preferably, the mammal is human.

Administration "in combination with" one or more further therapeutic agents includes simultaneous

236

(concurrent) and consecutive administration in any order.

"Carriers" as used herein include pharmaceutically acceptable carriers, excipients, or stabilizers which are nontoxic to the cell or mammal being exposed thereto at the dosages and concentrations employed. Often the physiologically acceptable carrier is an aqueous pH buffered solution. Examples of physiologically acceptable carriers include buffers such as phosphate, citrate, and other organic acids; antioxidants including ascorbic acid; low molecular weight (less than about 10 residues) polypeptide; proteins, such as serum albumin, gelatin, or immunoglobulins; hydrophilic polymers such as polyvinylpyrrolidone; amino acids such as glycine, glutamine, asparagine, arginine or lysine; monosaccharides, disaccharides, and other carbohydrates including glucose, mannose, or dextrins; chelating agents such as EDTA; sugar alcohols such as mannitol or sorbitol; salt-forming counterions such as sodium; and/or nonionic surfactants such as TWEEN® , polyethylene glycol (PEG), and PLURONICS®.

By "solid phase" or "solid support" is meant a non-aqueous matrix to which an antibody, TAT binding oligopeptide or TAT binding organic molecule of the present invention can adhere or attach. Examples of solid phases encompassed herein include those formed partially or entirely of glass (e.g., controlled pore glass), polysaccharides (e.g., agarose), polyacrylamides, polystyrene, polyvinyl alcohol and silicones. In certain embodiments, depending on the context, the solid phase can comprise the well of an assay plate; in others it is a purification column (e.g., an affinity chromatography column). This term also includes a discontinuous solid phase of discrete particles, such as those described in U.S. Patent No. 4,275,149.

A "liposome" is a small vesicle composed of various types of lipids, phospholipids and/or surfactant which is useful for delivery of a drug (such as a TAT polypeptide, an antibody thereto or a TAT binding oligopeptide) to a mammal. The components of the liposome are commonly arranged in a bilayer formation, similar to the lipid arrangement of biological membranes.

A "small" molecule or "small" organic molecule is defined herein to have a molecular weight below about 500 Daltons.

An "effective amount" of a polypeptide, antibody, TAT binding oligopeptide, TAT binding organic molecule or an agonist or antagonist thereof as disclosed herein is an amount sufficient to carry out a specifically stated purpose. An "effective amount" may be determined empirically and in a routine manner, in relation to the stated purpose.

The term "therapeutically effective amount" refers to an amount of an antibody, polypeptide, TAT binding oligopeptide, TAT binding organic molecule or other drug effective to "treat" a disease or disorder in a subject or mammal. In the case of cancer, the therapeutically effective amount of the drug may reduce the number of cancer cells; reduce the tumor size; inhibit (i.e., slow to some extent and preferably stop) cancer cell infiltration into peripheral organs; inhibit (i.e., slow to some extent and preferably stop) tumor metastasis; inhibit, to some extent, tumor growth; and/or relieve to some extent one or more of the symptoms associated with the cancer. See the definition herein of "treating". To the extent the drug may prevent growth and/or kill existing cancer cells, it may be cytostatic and/or cytotoxic.

A "growth inhibitory amount" of an anti-TAT antibody, TAT polypeptide, TAT binding oligopeptide

237

or TAT binding organic molecule is an amount capable of inhibiting the growth of a cell, especially tumor, e.g., cancer cell, either *in vitro* or *in vivo*. A "growth inhibitory amount" of an anti-TAT antibody, TAT polypeptide, TAT binding oligopeptide or TAT binding organic molecule for purposes of inhibiting neoplastic cell growth may be determined empirically and in a routine manner.

A "cytotoxic amount" of an anti-TAT antibody, TAT polypeptide, TAT binding oligopeptide or TAT binding organic molecule is an amount capable of causing the destruction of a cell, especially tumor, e.g., cancer cell, either *in vitro* or *in vivo*. A "cytotoxic amount" of an anti-TAT antibody, TAT polypeptide, TAT binding oligopeptide or TAT binding organic molecule for purposes of inhibiting neoplastic cell growth may be determined empirically and in a routine manner.

The term "antibody" is used in the broadest sense and specifically covers, for example, single anti-TAT monoclonal antibodies (including agonist, antagonist, and neutralizing antibodies), anti-TAT antibody compositions with polyepitopic specificity, polyclonal antibodies, single chain anti-TAT antibodies, and fragments of anti-TAT antibodies (see below) as long as they exhibit the desired biological or immunological activity. The term "immunoglobulin" (Ig) is used interchangeable with antibody herein.

An "isolated antibody" is one which has been identified and separated and/or recovered from a component of its natural environment. Contaminant components of its natural environment are materials which would interfere with diagnostic or therapeutic uses for the antibody, and may include enzymes, hormones, and other proteinaceous or nonproteinaceous solutes. In preferred embodiments, the antibody will be purified (1) to greater than 95% by weight of antibody as determined by the Lowry method, and most preferably more than 99% by weight, (2) to a degree sufficient to obtain at least 15 residues of N-terminal or internal amino acid sequence by use of a spinning cup sequenator, or (3) to homogeneity by SDS-PAGE under reducing or nonreducing conditions using Coomassie blue or, preferably, silver stain. Isolated antibody includes the antibody in situ within recombinant cells since at least one component of the antibody's natural environment will not be present. Ordinarily, however, isolated antibody will be prepared by at least one purification step.

The basic 4-chain antibody unit is a heterotetrameric glycoprotein composed of two identical light (L) chains and two identical heavy (H) chains (an IgM antibody consists of 5 of the basic heterotetramer unit along with an additional polypeptide called J chain, and therefore contain 10 antigen binding sites, while secreted IgA antibodies can polymerize to form polyvalent assemblages comprising 2-5 of the basic 4-chain units along with J chain). In the case of IgGs, the 4-chain unit is generally about 150,000 daltons. Each L chain is linked to a H chain by one covalent disulfide bond, while the two H chains are linked to each other by one or more disulfide bonds depending on the H chain isotype. Each H and L chain also has regularly spaced intrachain disulfide bridges. Each H chain has at the N-terminus, a variable domain (V_H) followed by three constant domains (C_H) for each of the α and γ chains and four C_H domains for μ and ϵ isotypes. Each L chain has at the N-terminus, a variable domain (V_L) followed by a constant domain (C_L) at its other end. The V_L is aligned with the V_H and the C_L is aligned with the first constant domain of the heavy chain (C_H1). Particular amino acid residues are believed to form an interface between the light chain and heavy chain variable domains. The pairing of a V_H and V_L together forms a single antigen-binding site. For the structure and properties of the

238

different classes of antibodies, see, e.g., Basic and Clinical Immunology, 8th edition, Daniel P. Stites, Abba I. Terr and Tristram G. Parslow (eds.), Appleton & Lange, Norwalk, CT, 1994, page 71 and Chapter 6.

5

The L chain from any vertebrate species can be assigned to one of two clearly distinct types, called kappa and lambda, based on the amino acid sequences of their constant domains. Depending on the amino acid sequence of the constant domain of their heavy chains (C_H), immunoglobulins can be assigned to different classes or isotypes. There are five classes of immunoglobulins: IgA, IgD, IgE, IgG, and IgM, having heavy chains designated α, δ, ϵ, γ, and μ, respectively. The γ and α classes are further divided into subclasses on the basis of relatively minor differences in C_H sequence and function, e.g., humans express the following subclasses: IgG1, IgG2, IgG3, IgG4, IgA1, and IgA2.

10

15

20

The term "variable" refers to the fact that certain segments of the variable domains differ extensively in sequence among antibodies. The V domain mediates antigen binding and define specificity of a particular antibody for its particular antigen. However, the variability is not evenly distributed across the 110-amino acid span of the variable domains. Instead, the V regions consist of relatively invariant stretches called framework regions (FRs) of 15-30 amino acids separated by shorter regions of extreme variability called "hypervariable regions" that are each 9-12 amino acids long. The variable domains of native heavy and light chains each comprise four FRs, largely adopting a β-sheet configuration, connected by three hypervariable regions, which form loops connecting, and in some cases forming part of, the β-sheet structure. The hypervariable regions in each chain are held together in close proximity by the FRs and, with the hypervariable regions from the other chain, contribute to the formation of the antigen-binding site of antibodies (see Kabat et al., Sequences of Proteins of Immunological Interest, 5th Ed. Public Health Service, National Institutes of Health, Bethesda, MD. (1991)). The constant domains are not involved directly in binding an antibody to an antigen, but exhibit various effector functions, such as participation of the antibody in antibody dependent cellular cytotoxicity (ADCC).

25

The term "hypervariable region" when used herein refers to the amino acid residues of an antibody which are responsible for antigen-binding. The hypervariable region generally comprises amino acid residues from a "complementarity determining region" or "CDR" (e.g. around about residues 24-34 (L1), 50-56 (L2) and 89-97 (L3) in the V_L, and around about 1-35 (H1), 50-65 (H2) and 95-102 (H3) in the V_H; Kabat et al., Sequences of Proteins of Immunological Interest, 5th Ed. Public Health Service, National Institutes of Health, Bethesda, MD. (1991)) and/or those residues from a "hypervariable loop" (e.g. residues 26-32 (L1), 50-52 (L2) and 91-96 (L3) in the V_L, and 26-32 (H1), 53-55 (H2) and 96-101 (H3) in the V_H; Chothia and Lesk J. Mol. Biol. 196:901-917 (1987)).

30

35

The term "monoclonal antibody" as used herein refers to an antibody obtained from a population of substantially homogeneous antibodies, i.e., the individual antibodies comprising the population are identical except for possible naturally occurring mutations that may be present in minor amounts. Monoclonal antibodies are highly specific, being directed against a single antigenic site. Furthermore, in contrast to polyclonal antibody preparations which include different antibodies directed against different determinants (epitopes), each monoclonal antibody is directed against a single determinant on the antigen. In addition to their specificity, the monoclonal antibodies are advantageous in that they may be synthesized uncontaminated by other antibodies.

239

The modifier "monoclonal" is not to be construed as requiring production of the antibody by any particular method. For example, the monoclonal antibodies useful in the present invention may be prepared by the hybridoma methodology first described by Kohler et al., Nature, 256:495 (1975), or may be made using recombinant DNA methods in bacterial, eukaryotic animal or plant cells (see, e.g., U.S. Patent No. 4,816,567). The "monoclonal antibodies" may also be isolated from phage antibody libraries using the techniques described in Clackson et al., Nature, 352:624-628 (1991) and Marks et al., J. Mol. Biol., 222:581-597 (1991), for · example.

The monoclonal antibodies herein include "chimeric" antibodies in which a portion of the heavy and/or light chain is identical with or homologous to corresponding sequences in antibodies derived from a particular species or belonging to a particular antibody class or subclass, while the remainder of the chain(s) is identical with or homologous to corresponding sequences in antibodies derived from another species or belonging to another antibody class or subclass, as well as fragments of such antibodies, so long as they exhibit the desired biological activity (see U.S. Patent No. 4,816,567; and Morrison et al., Proc. Natl. Acad. Sci. USA, 81:6851-6855 (1984)). Chimeric antibodies of interest herein include "primatized" antibodies comprising variable domain antigen-binding sequences derived from a non-human primate (e.g. Old World Monkey, Ape etc), and human constant region sequences.

An "intact" antibody is one which comprises an antigen-binding site as well as a C_L and at least heavy chain constant domains, C_H1, C_H2 and C_H3. The constant domains may be native sequence constant domains (e.g. human native sequence constant domains) or amino acid sequence variant thereof. Preferably, the intact antibody has one or more effector functions.

"Antibody fragments" comprise a portion of an intact antibody, preferably the antigen binding or variable region of the intact antibody. Examples of antibody fragments include Fab, Fab', F(ab')$_2$, and Fv fragments; diabodies; linear antibodies (see U.S. Patent No. 5,641,870, Example 2; Zapata et al., Protein Eng. 8(10): 1057-1062 [1995]); single-chain antibody molecules; and multispecific antibodies formed from antibody fragments.

Papain digestion of antibodies produces two identical antigen-binding fragments, called "Fab" fragments, and a residual "Fc" fragment, a designation reflecting the ability to crystallize readily. The Fab fragment consists of an entire L chain along with the variable region domain of the H chain (V_H), and the first constant domain of one heavy chain (C_H1). Each Fab fragment is monovalent with respect to antigen binding, i.e., it has a single antigen-binding site. Pepsin treatment of an antibody yields a single large F(ab')$_2$ fragment which roughly corresponds to two disulfide linked Fab fragments having divalent antigen-binding activity and is still capable of cross-linking antigen. Fab' fragments differ from Fab fragments by having additional few residues at the carboxy terminus of the C_H1 domain including one or more cysteines from the antibody hinge region. Fab'-SH is the designation herein for Fab' in which the cysteine residue(s) of the constant domains bear a free thiol group. F(ab')$_2$ antibody fragments originally were produced as pairs of Fab' fragments which have hinge cysteines between them. Other chemical couplings of antibody fragments are also known.

The Fc fragment comprises the carboxy-terminal portions of both H chains held together by disulfides.

240

The effector functions of antibodies are determined by sequences in the Fc region, which region is also the part recognized by Fc receptors (FcR) found on certain types of cells.

"Fv" is the minimum antibody fragment which contains a complete antigen-recognition and -binding site. This fragment consists of a dimer of one heavy- and one light-chain variable region domain in tight, non-covalent association. From the folding of these two domains emanate six hypervariable loops (3 loops each from the H and L chain) that contribute the amino acid residues for antigen binding and confer antigen binding specificity to the antibody. However, even a single variable domain (or half of an Fv comprising only three CDRs specific for an antigen) has the ability to recognize and bind antigen, although at a lower affinity than the entire binding site.

"Single-chain Fv" also abbreviated as "sFv" or "scFv" are antibody fragments that comprise the V_H and V_L antibody domains connected into a single polypeptide chain. Preferably, the sFv polypeptide further comprises a polypeptide linker between the V_H and V_L domains which enables the sFv to form the desired structure for antigen binding. For a review of sFv, see Pluckthun in   The Pharmacology of Monoclonal Antibodies, vol. 113, Rosenburg and Moore eds., Springer-Verlag, New York, pp. 269-315 (1994); Borrebaeck 1995, infra.

The term "diabodies" refers to small antibody fragments prepared by constructing sFv fragments (see preceding paragraph) with short linkers (about 5-10 residues) between the V_H and V_L domains such that inter-chain but not intra-chain pairing of the V domains is achieved, resulting in a bivalent fragment, i.e., fragment having two antigen-binding sites. Bispecific diabodies are heterodimers of two "crossover" sFv fragments in which the V_H and V_L domains of the two antibodies are present on different polypeptide chains. Diabodies are described more fully in, for example, EP 404,097; WO 93/11161; and Hollinger et al., Proc. Natl. Acad. Sci. USA, 90:6444-6448 (1993).

"Humanized" forms of non-human (e.g., rodent) antibodies are chimeric antibodies that contain minimal sequence derived from the non-human antibody. For the most part, humanized antibodies are human immunoglobulins (recipient antibody) in which residues from a hypervariable region of the recipient are replaced by residues from a hypervariable region of a non-human species (donor antibody) such as mouse, rat, rabbit or non-human primate having the desired antibody specificity, affinity, and capability. In some instances, framework region (FR) residues of the human immunoglobulin are replaced by corresponding non-human residues. Furthermore, humanized antibodies may comprise residues that are not found in the recipient antibody or in the donor antibody. These modifications are made to further refine antibody performance. In general, the humanized antibody will comprise substantially all of at least one, and typically two, variable domains, in which all or substantially all of the hypervariable loops correspond to those of a non-human immunoglobulin and all or substantially all of the FRs are those of a human immunoglobulin sequence. The humanized antibody optionally also will comprise at least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin. For further details, see Jones et al., Nature 321:522-525 (1986); Riechmann et al., Nature 332:323-329 (1988); and Presta, Curr. Op. Struct. Biol. 2:593-596 (1992).

A "species-dependent antibody," e.g., a mammalian anti-human IgE antibody, is an antibody which

has a stronger binding affinity for an antigen from a first mammalian species than it has for a homologue of that antigen from a second mammalian species. Normally, the species-dependent antibody "bind specifically" to a human antigen (i.e., has a binding affinity (Kd) value of no more than about 1×10^{-7} M, preferably no more than about 1×10^{-8} and most preferably no more than about 1×10^{-9} M) but has a binding affinity for a homologue of the antigen from a second non-human mammalian species which is at least about 50 fold, or at least about 500 fold, or at least about 1000 fold, weaker than its binding affinity for the human antigen. The species-dependent antibody can be of any of the various types of antibodies as defined above, but preferably is a humanized or human antibody.

A "TAT binding oligopeptide" is an oligopeptide that binds, preferably specifically, to a TAT polypeptide as described herein. TAT binding oligopeptides may be chemically synthesized using known oligopeptide synthesis methodology or may be prepared and purified using recombinant technology. TAT binding oligopeptides are usually at least about 5 amino acids in length, alternatively at least about 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or 100 amino acids in length or more, wherein such oligopeptides that are capable of binding, preferably specifically, to a TAT polypeptide as described herein. TAT binding oligopeptides may be identified without undue experimentation using well known techniques. In this regard, it is noted that techniques for screening oligopeptide libraries for oligopeptides that are capable of specifically binding to a polypeptide target are well known in the art (see, e.g., U.S. Patent Nos. 5,556,762, 5,750,373, 4,708,871, 4,833,092, 5,223,409, 5,403,484, 5,571,689, 5,663,143; PCT Publication Nos. WO 84/03506 and WO84/03564; Geysen et al., Proc. Natl. Acad. Sci. U.S.A., 81:3998-4002 (1984); Geysen et al., Proc. Natl. Acad. Sci. U.S.A., 82:178-182 (1985); Geysen et al., in Synthetic Peptides as Antigens, 130-149 (1986); Geysen et al., J. Immunol. Meth., 102:259-274 (1987); Schoofs et al., J. Immunol., 140:611-616 (1988), Cwirla, S. E. et al. (1990) Proc. Natl. Acad. Sci. USA, 87:6378; Lowman, H.B. et al. (1991) Biochemistry, 30:10832; Clackson, T. et al. (1991) Nature, 352: 624; Marks, J. D. et al. (1991), J. Mol. Biol., 222:581; Kang, A.S. et al. (1991) Proc. Natl. Acad. Sci. USA, 88:8363, and Smith, G. P. (1991) Current Opin. Biotechnol., 2:668).

A "TAT binding organic molecule" is an organic molecule other than an oligopeptide or antibody as defined herein that binds, preferably specifically, to a TAT polypeptide as described herein. TAT binding organic molecules may be identified and chemically synthesized using known methodology (see, e.g., PCT Publication Nos. WO00/00823 and WO00/39585). TAT binding organic molecules are usually less than about 2000 daltons in size, alternatively less than about 1500, 750, 500, 250 or 200 daltons in size, wherein such organic molecules that are capable of binding, preferably specifically, to a TAT polypeptide as described herein may be identified without undue experimentation using well known techniques. In this regard, it is noted that techniques for screening organic molecule libraries for molecules that are capable of binding to a polypeptide target are well known in the art (see, e.g., PCT Publication Nos. WO00/00823 and WO00/39585).

An antibody, oligopeptide or other organic molecule "which binds" an antigen of interest, e.g. a tumor-associated polypeptide antigen target, is one that binds the antigen with sufficient affinity such that the antibody, oligopeptide or other organic molecule is useful as a diagnostic and/or therapeutic agent in targeting a cell or tissue expressing the antigen, and does not significantly cross-react with other proteins. In such embodiments, the extent of binding of the antibody, oligopeptide or other organic molecule to a "non-target" protein will be less than about 10% of the binding of the antibody, oligopeptide or other organic molecule to its particular target protein as determined by fluorescence activated cell sorting (FACS) analysis or radioimmunoprecipitation (RIA). With regard to the binding of an antibody, oligopeptide or other organic molecule to a target molecule, the term "specific binding" or "specifically binds to" or is "specific for" a particular polypeptide or an epitope on a particular polypeptide target means binding that is measurably different from a non-specific interaction. Specific binding can be measured, for example, by determining binding of a molecule compared to binding of a control molecule, which generally is a molecule of similar structure that does not have binding activity. For example, specific binding can be determined by competition with a control molecule that is similar to the target, for example, an excess of non-labeled target. In this case, specific binding is indicated if the binding of the labeled target to a probe is competitively inhibited by excess unlabeled target. The term "specific binding" or "specifically binds to" or is "specific for" a particular polypeptide or an epitope on a particular polypeptide target as used herein can be exhibited, for example, by a molecule having a Kd for the target of at least about 10^{-4} M, alternatively at least about 10^{-5} M, alternatively at least about 10^{-6} M, alternatively at least about 10^{-7} M, alternatively at least about 10^{-8} M, alternatively at least about 10^{-9} M, alternatively at least about 10^{-10} M, alternatively at least about 10^{-11} M, alternatively at least about 10^{-12} M, or greater. In one embodiment, the term "specific binding" refers to binding where a molecule binds to a particular polypeptide or epitope on a particular polypeptide without substantially binding to any other polypeptide or polypeptide epitope.

An antibody, oligopeptide or other organic molecule that "inhibits the growth of tumor cells expressing a TAT polypeptide" or a "growth inhibitory" antibody, oligopeptide or other organic molecule is one which results in measurable growth inhibition of cancer cells expressing or overexpressing the appropriate TAT polypeptide. The TAT polypeptide may be a transmembrane polypeptide expressed on the surface of a cancer cell or may be a polypeptide that is produced and secreted by a cancer cell. Preferred growth inhibitory anti-TAT antibodies, oligopeptides or organic molecules inhibit growth of TAT-expressing tumor cells by greater

243

than 20%, preferably from about 20% to about 50%, and even more preferably, by greater than 50% (e.g., from about 50% to about 100%) as compared to the appropriate control, the control typically being tumor cells not treated with the antibody, oligopeptide or other organic molecule being tested. In one embodiment, growth inhibition can be measured at an antibody concentration of about 0.1 to 30 μg/ml or about 0.5 nM to 200 nM in cell culture, where the growth inhibition is determined 1-10 days after exposure of the tumor cells to the antibody. Growth inhibition of tumor cells *in vivo* can be determined in various ways such as is described in the Experimental Examples section below. The antibody is growth inhibitory in vivo if administration of the anti-TAT antibody at about 1 μg/kg to about 100 mg/kg body weight results in reduction in tumor size or tumor cell proliferation within about 5 days to 3 months from the first administration of the antibody, preferably within about 5 to 30 days.

An antibody, oligopeptide or other organic molecule which "induces apoptosis" is one which induces programmed cell death as determined by binding of annexin V, fragmentation of DNA, cell shrinkage, dilation of endoplasmic reticulum, cell fragmentation, and/or formation of membrane vesicles (called apoptotic bodies). The cell is usually one which overexpresses a TAT polypeptide. Preferably the cell is a tumor cell, e.g., a prostate, breast, ovarian, stomach, endometrial, lung, kidney, colon, bladder cell. Various methods are available for evaluating the cellular events associated with apoptosis. For example, phosphatidyl serine (PS) translocation can be measured by annexin binding; DNA fragmentation can be evaluated through DNA laddering; and nuclear/chromatin condensation along with DNA fragmentation can be evaluated by any increase in hypodiploid cells. Preferably, the antibody, oligopeptide or other organic molecule which induces apoptosis is one which results in about 2 to 50 fold, preferably about 5 to 50 fold, and most preferably about 10 to 50 fold, induction of annexin binding relative to untreated cell in an annexin binding assay.

Antibody "effector functions" refer to those biological activities attributable to the Fc region (a native sequence Fc region or amino acid sequence variant Fc region) of an antibody, and vary with the antibody isotype. Examples of antibody effector functions include: C1q binding and complement dependent cytotoxicity; Fc receptor binding; antibody-dependent cell-mediated cytotoxicity (ADCC); phagocytosis; down regulation of cell surface receptors (e.g., B cell receptor); and B cell activation.

"Antibody-dependent cell-mediated cytotoxicity" or "ADCC" refers to a form of cytotoxicity in which secreted Ig bound onto Fc receptors (FcRs) present on certain cytotoxic cells (e.g., Natural Killer (NK) cells, neutrophils, and macrophages) enable these cytotoxic effector cells to bind specifically to an antigen-bearing target cell and subsequently kill the target cell with cytotoxins. The antibodies "arm" the cytotoxic cells and are absolutely required for such killing. The primary cells for mediating ADCC, NK cells, express Fc γRIII only, whereas monocytes express FcγRI, FcγRII and FcγRIII. FcR expression on hematopoietic cells is summarized in Table 3 on page 464 of Ravetch and Kinet, Annu. Rev. Immunol. 9:457-92 (1991). To assess ADCC activity of a molecule of interest, an in vitro ADCC assay, such as that described in US Patent No. 5,500,362 or 5,821,337 may be performed. Useful effector cells for such assays include peripheral blood mononuclear cells (PBMC) and Natural Killer (NK) cells. Alternatively, or additionally, ADCC activity of the molecule of interest may be assessed in vivo, e.g., in a animal model such as that disclosed in Clynes et al.

244

(USA) 95:652-656 (1998).

"Fc receptor" or "FcR" describes a receptor that binds to the Fc region of an antibody. The preferred FcR is a native sequence human FcR. Moreover, a preferred FcR is one which binds an IgG antibody (a gamma receptor) and includes receptors of the FcγRI, FcγRII and FcγRIII subclasses, including allelic variants and alternatively spliced forms of these receptors. FcγRII receptors include FcγRIIA (an "activating receptor") and FcγRIIB (an "inhibiting receptor"), which have similar amino acid sequences that differ primarily in the cytoplasmic domains thereof. Activating receptor Fc γRIIA contains an immunoreceptor tyrosine-based activation motif (ITAM) in its cytoplasmic domain. Inhibiting receptor FcγRIIB contains an immunoreceptor tyrosine-based inhibition motif (ITIM) in its cytoplasmic domain. (see review M. in Daëron, Annu. Rev. Immunol. 15:203-234 (1997)). FcRs are reviewed in Ravetch and Kinet, Annu. Rev. Immunol. 9:457-492 (1991); Capel et al., Immunomethods 4:25-34 (1994); and de Haas et al., J. Lab. Clin. Med. 126:330-41 (1995). Other FcRs, including those to be identified in the future, are encompassed by the term "FcR" herein. The term also includes the neonatal receptor, FcRn, which is responsible for the transfer of maternal IgGs to the fetus (Guyer et al., J. Immunol. 117:587 (1976) and Kim et al., J. Immunol. 24:249 (1994)).

"Human effector cells" are leukocytes which express one or more FcRs and perform effector functions. Preferably, the cells express at least Fc γRIII and perform ADCC effector function. Examples of human leukocytes which mediate ADCC include peripheral blood mononuclear cells (PBMC), natural killer (NK) cells, monocytes, cytotoxic T cells and neutrophils; with PBMCs and NK cells being preferred. The effector cells may be isolated from a native source, e.g., from blood.

"Complement dependent cytotoxicity" or "CDC" refers to the lysis of a target cell in the presence of complement. Activation of the classical complement pathway is initiated by the binding of the first component of the complement system (C1q) to antibodies (of the appropriate subclass) which are bound to their cognate antigen. To assess complement activation, a CDC assay, e.g., as described in Gazzano-Santoro et al., J. Immunol. Methods 202:163 (1996), may be performed.

The terms "cancer" and "cancerous" refer to or describe the physiological condition in mammals that is typically characterized by unregulated cell growth. Examples of cancer include, but are not limited to, carcinoma, lymphoma, blastoma, sarcoma, and leukemia or lymphoid malignancies. More particular examples of such cancers include squamous cell cancer (e.g., epithelial squamous cell cancer), lung cancer including small-cell lung cancer, non-small cell lung cancer, adenocarcinoma of the lung and squamous carcinoma of the lung, cancer of the peritoneum, hepatocellular cancer, gastric or stomach cancer including gastrointestinal cancer, pancreatic cancer, glioblastoma, cervical cancer, ovarian cancer, liver cancer, bladder cancer, cancer of the urinary tract, hepatoma, breast cancer, colon cancer, rectal cancer, colorectal cancer, endometrial or uterine carcinoma, salivary gland carcinoma, kidney or renal cancer, prostate cancer, vulval cancer, thyroid cancer, hepatic carcinoma, anal carcinoma, penile carcinoma, melanoma, multiple myeloma and B-cell lymphoma, brain, as well as head and neck cancer, and associated metastases.

The terms "cell proliferative disorder" and "proliferative disorder" refer to disorders that are

245

associated with some degree of abnormal cell proliferation. In one embodiment, the cell proliferative disorder is cancer.

"Tumor", as used herein, refers to all neoplastic cell growth and proliferation, whether malignant or benign, and all pre-cancerous and cancerous cells and tissues.

An antibody, oligopeptide or other organic molecule which "induces cell death" is one which causes 5 a viable cell to become nonviable. The cell is one which expresses a TAT polypeptide, preferably a cell that overexpresses a TAT polypeptide as compared to a normal cell of the same tissue type. The TAT polypeptide may be a transmembrane polypeptide expressed on the surface of a cancer cell or may be a polypeptide that is produced and secreted by a cancer cell. Preferably, the cell is a cancer cell, e.g., a breast, ovarian, stomach, endometrial, salivary gland, lung, kidney, colon, thyroid, pancreatic or bladder cell. Cell death *in vitro* may 10 be determined in the absence of complement and immune effector cells to distinguish cell death induced by antibody-dependent cell-mediated cytotoxicity (ADCC) or complement dependent cytotoxicity (CDC). Thus, the assay for cell death may be performed using heat inactivated serum (i.e., in the absence of complement) and in the absence of immune effector cells. To determine whether the antibody, oligopeptide or other organic molecule is able to induce cell death, loss of membrane integrity as evaluated by uptake of propidium iodide 15 (PI), trypan blue (see Moore et al. Cytotechnology 17:1-11 (1995)) or 7AAD can be assessed relative to untreated cells. Preferred cell death-inducing antibodies, oligopeptides or other organic molecules are those which induce PI uptake in the PI uptake assay in BT474 cells.

A "TAT-expressing cell" is a cell which expresses an endogenous or transfected TAT polypeptide either on the cell surface or in a secreted form. A "TAT-expressing cancer" is a cancer comprising cells that 20 have a TAT polypeptide present on the cell surface or that produce and secrete a TAT polypeptide. A "TAT-expressing cancer" optionally produces sufficient levels of TAT polypeptide on the surface of cells thereof, such that an anti-TAT antibody, oligopeptide ot other organic molecule can bind thereto and have a therapeutic effect with respect to the cancer. In another embodiment, a "TAT-expressing cancer" optionally produces and secretes sufficient levels of TAT polypeptide, such that an anti-TAT antibody, oligopeptide ot other organic 25 molecule antagonist can bind thereto and have a therapeutic effect with respect to the cancer. With regard to the latter, the antagonist may be an antisense oligonucleotide which reduces, inhibits or prevents production and secretion of the secreted TAT polypeptide by tumor cells. A cancer which "overexpresses" a TAT polypeptide is one which has significantly higher levels of TAT polypeptide at the cell surface thereof, or produces and secretes, compared to a noncancerous cell of the same tissue type. Such overexpression may be caused by gene 30 amplification or by increased transcription or translation. TAT polypeptide overexpression may be determined in a diagnostic or prognostic assay by evaluating increased levels of the TAT protein present on the surface of a cell, or secreted by the cell (e.g., via an immunohistochemistry assay using anti-TAT antibodies prepared against an isolated TAT polypeptide which may be prepared using recombinant DNA technology from an isolated nucleic acid encoding the TAT polypeptide; FACS analysis, etc.). Alternatively, or additionally, one 35 may measure levels of TAT polypeptide-encoding nucleic acid or mRNA in the cell, e.g., via fluorescent *in situ* hybridization using a nucleic acid based probe corresponding to a TAT-encoding nucleic acid or the complement

246

thereof; (FISH; see WO98/45479 published October, 1998), Southern blotting, Northern blotting, or polymerase chain reaction (PCR) techniques, such as real time quantitative PCR (RT-PCR). One may also study TAT polypeptide overexpression by measuring shed antigen in a biological fluid such as serum, e.g., using antibody-based assays (see also, e.g., U.S. Patent No. 4,933,294 issued June 12, 1990; WO91/05264 published April 18, 1991; U.S. Patent 5,401,638 issued March 28, 1995; and Sias et al., J. Immunol. Methods 132:73-80 (1990)). Aside from the above assays, various *in vivo* assays are available to the skilled practitioner. For example, one may expose cells within the body of the patient to an antibody which is optionally labeled with a detectable label, e.g., a radioactive isotope, and binding of the antibody to cells in the patient can be evaluated, e.g., by external scanning for radioactivity or by analyzing a biopsy taken from a patient previously exposed to the antibody.

As used herein, the term "immunoadhesin" designates antibody-like molecules which combine the binding specificity of a heterologous protein (an "adhesin") with the effector functions of immunoglobulin constant domains. Structurally, the immunoadhesins comprise a fusion of an amino acid sequence with the desired binding specificity which is other than the antigen recognition and binding site of an antibody (i.e., is "heterologous"), and an immunoglobulin constant domain sequence. The adhesin part of an immunoadhesin molecule typically is a contiguous amino acid sequence comprising at least the binding site of a receptor or a ligand. The immunoglobulin constant domain sequence in the immunoadhesin may be obtained from any immunoglobulin, such as IgG-1, IgG-2, IgG-3, or IgG-4 subtypes, IgA (including IgA-1 and IgA-2), IgE, IgD or IgM.

The word "label" when used herein refers to a detectable compound or composition which is conjugated directly or indirectly to the antibody, oligopeptide or other organic molecule so as to generate a "labeled" antibody, oligopeptide or other organic molecule. The label may be detectable by itself (e.g. radioisotope labels or fluorescent labels) or, in the case of an enzymatic label, may catalyze chemical alteration of a substrate compound or composition which is detectable.

The term "cytotoxic agent" as used herein refers to a substance that inhibits or prevents the function of cells and/or causes destruction of cells. The term is intended to include radioactive isotopes (e.g., At^{211}, I^{131}, I^{125}, Y^{90}, Re^{186}, Re^{188}, Sm^{153}, Bi^{212}, P^{32} and radioactive isotopes of Lu), chemotherapeutic agents e.g. methotrexate, adriamicin, vinca alkaloids (vincristine, vinblastine, etoposide), doxorubicin, melphalan, mitomycin C, chlorambucil, daunorubicin or other intercalating agents, enzymes and fragments thereof such as nucleolytic enzymes, antibiotics, and toxins such as small molecule toxins or enzymatically active toxins of bacterial, fungal, plant or animal origin, including fragments and/or variants thereof, and the various antitumor or anticancer agents disclosed below. Other cytotoxic agents are described below. A tumoricidal agent causes destruction of tumor cells.

A "growth inhibitory agent" when used herein refers to a compound or composition which inhibits growth of a cell, especially a TAT-expressing cancer cell, either *in vitro* or *in vivo*. Thus, the growth inhibitory agent may be one which significantly reduces the percentage of TAT-expressing cells in S phase. Examples of growth inhibitory agents include agents that block cell cycle progression (at a place other than S phase), such

247

as agents that induce G1 arrest and M-phase arrest. Classical M-phase blockers include the vincas (vincristine and vinblastine), taxanes, and topoisomerase II inhibitors such as doxorubicin, epirubicin, daunorubicin, etoposide, and bleomycin. Those agents that arrest G1 also spill over into S-phase arrest, for example, DNA alkylating agents such as tamoxifen, prednisone, dacarbazine, mechlorethamine, cisplatin, methotrexate, 5-fluorouracil, and ara-C. Further information can be found in The Molecular Basis of Cancer, Mendelsohn and Israel, eds., Chapter 1, entitled "Cell cycle regulation, oncogenes, and antineoplastic drugs" by Murakami et al. (WB Saunders: Philadelphia, 1995), especially p. 13. The taxanes (paclitaxel and docetaxel) are anticancer drugs both derived from the yew tree. Docetaxel (TAXOTERE®, Rhone-Poulenc Rorer), derived from the European yew, is a semisynthetic analogue of paclitaxel (TAXOL®, Bristol-Myers Squibb). Paclitaxel and docetaxel promote the assembly of microtubules from tubulin dimers and stabilize microtubules by preventing depolymerization, which results in the inhibition of mitosis in cells.

"Doxorubicin" is an anthracycline antibiotic. The full chemical name of doxorubicin is (8S-cis)-10-[(3-amino-2,3,6-trideoxy-α-L-lyxo-hexapyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-8-(hydroxyacetyl)-1-methoxy-5,12-naphthacenedione.

The term "cytokine" is a generic term for proteins released by one cell population which act on another cell as intercellular mediators. Examples of such cytokines are lymphokines, monokines, and traditional polypeptide hormones. Included among the cytokines are growth hormone such as human growth hormone, N-methionyl human growth hormone, and bovine growth hormone; parathyroid hormone; thyroxine; insulin; proinsulin; relaxin; prorelaxin; glycoprotein hormones such as follicle stimulating hormone (FSH), thyroid stimulating hormone (TSH), and luteinizing hormone (LH); hepatic growth factor; fibroblast growth factor; prolactin; placental lactogen; tumor necrosis factor-α and -β; mullerian-inhibiting substance; mouse gonadotropin-associated peptide; inhibin; activin; vascular endothelial growth factor; integrin; thrombopoietin (TPO); nerve growth factors such as NGF-β; platelet-growth factor; transforming growth factors (TGFs) such as TGF-α and TGF- β; insulin-like growth factor-I and -II; erythropoietin (EPO); osteoinductive factors; interferons such as interferon -α, -β, and -γ; colony stimulating factors (CSFs) such as macrophage-CSF (M-CSF); granulocyte-macrophage-CSF (GM-CSF); and granulocyte-CSF (G-CSF); interleukins (ILs) such as IL-1, IL- 1a, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-11, IL-12; a tumor necrosis factor such as TNF-α or TNF-β; and other polypeptide factors including LIF and kit ligand (KL). As used herein, the term cytokine includes proteins from natural sources or from recombinant cell culture and biologically active equivalents of the native sequence cytokines.

The term "package insert" is used to refer to instructions customarily included in commercial packages of therapeutic products, that contain information about the indications, usage, dosage, administration, contraindications and/or warnings concerning the use of such therapeutic products.

Table 1

```
/*
 *
 * C-C increased from 12 to 15
 * Z is average of EQ
 * B is average of ND
 * match with stop is _M; stop-stop = 0; J (joker) match = 0
 */
#define   _M      -8        /* value of a match with a stop */

int      _day[26][26] = {
/*      A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z */
/* A */ { 2, 0,-2, 0, 0,-4, 1,-1,-1, 0,-1,-2,-1, 0,_M, 1, 0,-2, 1, 1, 0, 0,-6, 0,-3, 0},
/* B */ { 0, 3,-4, 3, 2,-5, 0, 1,-2, 0, 0,-3,-2, 2,_M,-1, 1, 0, 0, 0, 0,-2,-5, 0,-3, 1},
/* C */ {-2,-4,15,-5,-5,-4,-3,-3,-2, 0,-5,-6,-5,-4,_M,-3,-5,-4, 0,-2, 0,-2,-8, 0, 0,-5},
/* D */ { 0, 3,-5, 4, 3,-6, 1, 1,-2, 0, 0,-4,-3, 2,_M,-1, 2,-1, 0, 0, 0,-2,-7, 0,-4, 2},
/* E */ { 0, 2,-5, 3, 4,-5, 0, 1,-2, 0, 0,-3,-2, 1,_M,-1, 2,-1, 0, 0, 0,-2,-7, 0,-4, 3},
/* F */ {-4,-5,-4,-6,-5, 9,-5,-2, 1, 0,-5, 2, 0,-4,_M,-5,-5,-4,-3,-3, 0,-1, 0, 0, 7,-5},
/* G */ { 1, 0,-3, 1, 0,-5, 5,-2,-3, 0,-2,-4,-3, 0,_M,-1,-1,-3, 1, 0, 0,-1,-7, 0,-5, 0},
/* H */ {-1, 1,-3, 1, 1,-2,-2, 6,-2, 0, 0,-2,-2, 2,_M, 0, 3, 2,-1,-1, 0,-2,-3, 0, 0, 2},
/* I */ {-1,-2,-2,-2,-2, 1,-3,-2, 5, 0,-2, 2, 2,-2,_M,-2,-2,-2,-1, 0, 0, 4,-5, 0,-1,-2},
/* J */ { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,_M, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
/* K */ {-1, 0,-5, 0, 0,-5,-2, 0,-2, 0, 5,-3, 0, 1,_M,-1, 1, 3, 0, 0, 0,-2,-3, 0,-4, 0},
/* L */ {-2,-3,-6,-4,-3, 2,-4,-2, 2, 0,-3, 6, 4,-3,_M,-3,-2,-3,-3,-1, 0, 2,-2, 0,-1,-2},
/* M */ {-1,-2,-5,-3,-2, 0,-3,-2, 2, 0, 0, 4, 6,-2,_M,-2,-1, 0,-2,-1, 0, 2,-4, 0,-2,-1},
/* N */ { 0, 2,-4, 2, 1,-4, 0, 2,-2, 0, 1,-3,-2, 2,_M,-1, 1, 0, 1, 0, 0,-2,-4, 0,-2, 1},
/* O */ {_M,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M, 0,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M,_M},
/* P */ { 1,-1,-3,-1,-1,-5,-1, 0,-2, 0,-1,-3,-2,-1,_M, 6, 0, 0, 1, 0, 0,-1,-6, 0,-5, 0},
/* Q */ { 0, 1,-5, 2, 2,-5,-1, 3,-2, 0, 1,-2,-1, 1,_M, 0, 4, 1,-1,-1, 0,-2,-5, 0,-4, 3},
/* R */ {-2, 0,-4,-1,-1,-4,-3, 2,-2, 0, 3,-3, 0, 0,_M, 0, 1, 6, 0,-1, 0,-2, 2, 0,-4, 0},
/* S */ { 1, 0, 0, 0, 0,-3, 1,-1,-1, 0, 0,-3,-2, 1,_M, 1,-1, 0, 2, 1, 0,-1,-2, 0,-3, 0},
/* T */ { 1, 0,-2, 0, 0,-3, 0,-1, 0, 0, 0,-1,-1, 0,_M, 0,-1,-1, 1, 3, 0, 0,-5, 0,-3, 0},
/* U */ { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,_M, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
/* V */ { 0,-2,-2,-2,-2,-1,-1,-2, 4, 0,-2, 2, 2,-2,_M,-1,-2,-2,-1, 0, 0, 4,-6, 0,-2,-2},
/* W */ {-6,-5,-8,-7,-7, 0,-7,-3,-5, 0,-3,-2,-4,-4,_M,-6,-5, 2,-2,-5, 0,-6,17, 0, 0,-6},
/* X */ { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,_M, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
/* Y */ {-3,-3, 0,-4,-4, 7,-5, 0,-1, 0,-4,-1,-2,-2,_M,-5,-4,-4,-3,-3, 0,-2, 0, 0,10,-4},
/* Z */ { 0, 1,-5, 2, 3,-5, 0, 2,-2, 0, 0,-2,-1, 1,_M, 0, 3, 0, 0, 0, 0,-2,-6, 0,-4, 4}
};
```

Table 1 (cont')

```
/*
*/
#include <stdio.h>
#include <ctype.h>

#define  MAXJMP      16        /* max jumps in a diag */
#define  MAXGAP      24        /* don't continue to penalize gaps larger than this */
#define  JMPS        1024      /* max jmps in an path */
#define  MX          4         /* save if there's at least MX-1 bases since last jmp */

#define  DMAT        3         /* value of matching bases */
#define  DMIS        0         /* penalty for mismatched bases */
#define  DINS0       8         /* penalty for a gap */
#define  DINS1       1         /* penalty per base */
#define  PINS0       8         /* penalty for a gap */
#define  PINS1       4         /* penalty per residue */

struct jmp {
         short          n[MAXJMP];    /* size of jmp (neg for dely) */
         unsigned short x[MAXJMP];    /* base no. of jmp in seq x */
};                                    /* limits seq to 2^16 -1 */

struct diag {
         int            score;        /* score at last jmp */
         long           offset;       /* offset of prev block */
         short          ijmp;         /* current jmp index */
         struct jmp     jp;           /* list of jmps */
};

struct path {
         int            spc;          /* number of leading spaces */
         short          n[JMPS];/* size of jmp (gap) */
         int            x[JMPS];/* loc of jmp (last elem before gap) */
};

char            *ofile;              /* output file name */
char            *namex[2];           /* seq names: getseqs() */
char            *prog;               /* prog name for err msgs */
char            *seqx[2];            /* seqs: getseqs() */
int             dmax;                /* best diag: nw() */
int             dmax0;               /* final diag */
int             dna;                 /* set if dna: main() */
int             endgaps;             /* set if penalizing end gaps */
int             gapx, gapy;          /* total gaps in seqs */
int             len0, len1;          /* seq lens */
int             ngapx, ngapy;        /* total size of gaps */
int             smax;                /* max score: nw() */
int             *xbm;                /* bitmap for matching */
long            offset;              /* current offset in jmp file */
struct   diag   *dx;                 /* holds diagonals */
struct   path   pp[2];               /* holds path for seqs */

char            *calloc(), *malloc(), *index(), *strcpy();
char            *getseq(), *g_calloc();
```

251

Table 1 (cont')

```
/* Needleman-Wunsch alignment program
 *
 * usage: progs file1 file2
 *   where file1 and file2 are two dna or two protein sequences.
 *   The sequences can be in upper- or lower-case an may contain ambiguity
 *   Any lines beginning with ';', '>' or '<' are ignored
 *   Max file length is 65535 (limited by unsigned short x in the jmp struct)
 *   A sequence with 1/3 or more of its elements ACGTU is assumed to be DNA
 *   Output is in the file "align.out"
 *
 * The program may create a tmp file in /tmp to hold info about traceback.
 * Original version developed under BSD 4.3 on a vax 8650
 */
#include "nw.h"
#include "day.h"

static    _dbval[26] = {
          1,14,2,13,0,0,4,11,0,0,12,0,3,15,0,0,0,5,6,8,8,7,9,0,10,0
};

static    _pbval[26] = {
          1, 2|(1<<('D'-'A'))|(1<<('N'-'A')), 4, 8, 16, 32, 64,
          128, 256, 0xFFFFFFF, 1<<10, 1<<11, 1<<12, 1<<13, 1<<14,
          1<<15, 1<<16, 1<<17, 1<<18, 1<<19, 1<<20, 1<<21, 1<<22,
          1<<23, 1<<24, 1<<25|(1<<('E'-'A'))|(1<<('Q'-'A'))
};


main(ac, av)                                                          main
          int       ac;
          char      *av[];
{
          prog = av[0];
          if (ac != 3) {
                    fprintf(stderr,"usage: %s file1 file2\n", prog);
                    fprintf(stderr,"where file1 and file2 are two dna or two protein sequences.\n");
                    fprintf(stderr,"The sequences can be in upper- or lower-case\n");
                    fprintf(stderr,"Any lines beginning with ';' or '<' are ignored\n");
                    fprintf(stderr,"Output is in the file \"align.out\"\n");
                    exit(1);
          }
          namex[0] = av[1];
          namex[1] = av[2];
          seqx[0] = getseq(namex[0], &len0);
          seqx[1] = getseq(namex[1], &len1);
          xbm = (dna)? _dbval : _pbval;

          endgaps = 0;              /* 1 to penalize endgaps */
          ofile = "align.out";               /* output file */

          nw();          /* fill in the matrix, get the possible jmps */
          readjmps();    /* get the actual jmps */
          print();       /* print stats, alignment */

          cleanup(0);    /* unlink any tmp files */}
```

Table 1 (cont')

```
/* do the alignment, return best score: main()
 * dna: values in Fitch and Smith, PNAS, 80, 1382-1386, 1983
 * pro: PAM 250 values
 * When scores are equal, we prefer mismatches to any gap, prefer
 * a new gap to extending an ongoing gap, and prefer a gap in seqx
 * to a gap in seq y.
 */
nw()                                                                                      nw·
{
        char            *px, *py;          /* seqs and ptrs */
        int             *ndely, *dely;     /* keep track of dely */
        int             ndelx, delx;       /* keep track of delx */
        int             *tmp;              /* for swapping row0, row1 */
        int             mis;               /* score for each type */
        int             ins0, ins1;        /* insertion penalties */
        register        id;                /* diagonal index */
        register        ij;                /* jmp index */
        register        *col0, *col1;      /* score for curr, last row */
        register        xx, yy;            /* index into seqs */

        dx = (struct diag *)g_calloc("to get diags", len0+len1+1, sizeof(struct diag));
        ndely = (int *)g_calloc("to get ndely", len1+1, sizeof(int));
        dely = (int *)g_calloc("to get dely", len1+1, sizeof(int));
        col0 = (int *)g_calloc("to get col0", len1+1, sizeof(int));
        col1 = (int *)g_calloc("to get col1", len1+1, sizeof(int));
        ins0 = (dna)? DINS0 : PINS0;
        ins1 = (dna)? DINS1 : PINS1;
        smax = -10000;
        if (endgaps) {
                for (col0[0] = dely[0] = -ins0, yy = 1; yy <= len1; yy++) {
                        col0[yy] = dely[yy] = col0[yy-1] - ins1;
                        ndely[yy] = yy;
                }
                col0[0] = 0;            /* Waterman Bull Math Biol 84 */
        }
        else
                for (yy = 1; yy <= len1; yy++)
                        dely[yy] = -ins0;
        /* fill in match matrix
         */
        for (px = seqx[0], xx = 1; xx <= len0; px++, xx++) {
                /* initialize first entry in col
                 */
                if (endgaps) {
                        if (xx == 1)
                                col1[0] = delx = -(ins0+ins1);
                        else
                                col1[0] = delx = col0[0] - ins1;
                        ndelx = xx;
                }
                else {
                        col1[0] = 0;
                        delx = -ins0;
                        ndelx = 0;
                }
```

Table 1 (cont')

```
for (py = seqx[1], yy = 1; yy <= len1; py++, yy++) {
        mis = col0[yy-1];
        if (dna)
                mis += (xbm[*px-'A']&xbm[*py-'A'])? DMAT : DMIS;
        else
                mis += _day[*px-'A'][*py-'A'];


        /* update penalty for del in x seq;
         * favor new del over ongong del
         * ignore MAXGAP if weighting endgaps
         */
        if (endgaps || ndely[yy] < MAXGAP) {
                if (col0[yy] - ins0 >= dely[yy]) {
                        dely[yy] = col0[yy] - (ins0+ins1);
                        ndely[yy] = 1;
                } else {
                        dely[yy] -= ins1;
                        ndely[yy]++;
                }
        } else {
                if (col0[yy] - (ins0+ins1) >= dely[yy]) {
                        dely[yy] = col0[yy] - (ins0+ins1);
                        ndely[yy] = 1;
                } else
                        ndely[yy]++;
        }


        /* update penalty for del in y seq;
         * favor new del over ongong del
         */
        if (endgaps || ndelx < MAXGAP) {
                if (col1[yy-1] - ins0 >= delx) {
                        delx = col1[yy-1] - (ins0+ins1);
                        ndelx = 1;
                } else {
                        delx -= ins1;
                        ndelx++;
                }
        } else {
                if (col1[yy-1] - (ins0+ins1) >= delx) {
                        delx = col1[yy-1] - (ins0+ins1);
                        ndelx = 1;
                } else
                        ndelx++;
        }


        /* pick the maximum score; we're favoring
         * mis over any del and delx over dely
         */
```

```
        id = xx - yy + len1 - 1;
        if (mis >= delx && mis >= dely[yy])
                col1[yy] = mis;
```

Table 1 (cont')

```
        else if (delx > = dely[yy]) {
                col1[yy] = delx;
                ij = dx[id].ijmp;
                if (dx[id].jp.n[0] && (!dna || (ndelx > = MAXJMP
                && xx > dx[id].jp.x[ij]+MX) || mis > dx[id].score+DINS0)) {
                        dx[id].ijmp++;
                        if (++ij > = MAXJMP) {
                                writejmps(id);
                                ij = dx[id].ijmp = 0;
                                dx[id].offset = offset;
                                offset += sizeof(struct jmp) + sizeof(offset);
                        }
                }
                dx[id].jp.n[ij] = ndelx;
                dx[id].jp.x[ij] = xx;
                dx[id].score = delx;
        }
        else {
                col1[yy] = dely[yy];
                ij = dx[id].ijmp;
    if (dx[id].jp.n[0] && (!dna || (ndely[yy] > = MAXJMP
                && xx > dx[id].jp.x[ij]+MX) || mis > dx[id].score+DINS0)) {
                        dx[id].ijmp++;
                        if (++ij > = MAXJMP) {
                                writejmps(id);
                                ij = dx[id].ijmp = 0;
                                dx[id].offset = offset;
                                offset += sizeof(struct jmp) + sizeof(offset);
                        }
                }
                dx[id].jp.n[ij] = -ndely[yy];
                dx[id].jp.x[ij] = xx;
                dx[id].score = dely[yy];
        }
        if (xx == len0 && yy < len1) {
                /* last col
                */
                if (endgaps)
                        col1[yy] -= ins0+ins1*(len1-yy);
                if (col1[yy] > smax) {
                        smax = col1[yy];
                        dmax = id;
                }
        }
}
if (endgaps && xx < len0)
        col1[yy-1] -= ins0+ins1*(len0-xx);
if (col1[yy-1] > smax) {
        smax = col1[yy-1];
        dmax = id;
}
tmp = col0; col0 = col1; col1 = tmp;        }
(void) free((char *)ndely);
(void) free((char *)dely);
(void) free((char *)col0);
(void) free((char *)col1);                        }
```

Table 1 (cont')

```
/*
 *
 * print() -- only routine visible outside this module
 *
 * static:
 * getmat() -- trace back best path, count matches: print()
 * pr_align() -- print alignment of described in array p[]: print()
 * dumpblock() -- dump a block of lines with numbers, stars: pr_align()
 * nums() -- put out a number line: dumpblock()
 * putline() -- put out a line (name, [num], seq, [num]): dumpblock()
 * stars() - -put a line of stars: dumpblock()
 * stripname() -- strip any path and prefix from a seqname
 */

#include "nw.h"

#define SPC      3
#define P_LINE   256        /* maximum output line */
#define P_SPC    3          /* space between name or num and seq */

extern   _day[26][26];
int      olen;              /* set output line length */
FILE     *fx;              /* output file */

print()
{
        int      lx, ly, firstgap, lastgap;     /* overlap */

        if ((fx = fopen(ofile, "w")) == 0) {
                fprintf(stderr,"%s: can't write %s\n", prog, ofile);
                cleanup(1);
        }
        fprintf(fx, " <first sequence: %s (length = %d)\n", namex[0], len0);
        fprintf(fx, " <second sequence: %s (length = %d)\n", namex[1], len1);
        olen = 60;
        lx = len0;
        ly = len1;
        firstgap = lastgap = 0;
        if (dmax < len1 - 1) {          /* leading gap in x */
                pp[0].spc = firstgap = len1 - dmax - 1;
                ly -= pp[0].spc;
        }
        else if (dmax > len1 - 1) {   /* leading gap in y */
                pp[1].spc = firstgap = dmax - (len1 - 1);
                lx -= pp[1].spc;
        }
        if (dmax0 < len0 - 1) {         /* trailing gap in x */
                lastgap = len0 - dmax0 -1;
                lx -= lastgap;
        }
        else if (dmax0 > len0 - 1) { /* trailing gap in y */
                lastgap = dmax0 - (len0 - 1);
                ly -= lastgap;
        }
        getmat(lx, ly, firstgap, lastgap);
        pr_align();           }
```

print

Table 1 (cont')

```
/*
 * trace back the best path, count matches
 */
static
getmat(lx, ly, firstgap, lastgap)                                    getmat
        int     lx, ly;             /* "core" (minus endgaps) */
        int     firstgap, lastgap;  /* leading trailing overlap */
{
        int             nm, i0, i1, siz0, siz1;
        char            outx[32];
        double          pct;
        register        n0, n1;
        register char   *p0, *p1;
        /* get total matches, score
         */
        i0 = i1 = siz0 = siz1 = 0;
        p0 = seqx[0] + pp[1].spc;
        p1 = seqx[1] + pp[0].spc;
        n0 = pp[1].spc + 1;
        n1 = pp[0].spc + 1;
        nm = 0;
        while ( *p0 && *p1 ) {
                if (siz0) {
                        p1++;
                        n1++;
                        siz0--;
                }
                else if (siz1) {
                        p0++;
                        n0++;
                        siz1--;
                }
                else {
                        if (xbm[*p0-'A']&xbm[*p1-'A'])
                                nm++;
                        if (n0++ == pp[0].x[i0])
                                siz0 = pp[0].n[i0++];
                        if (n1++ == pp[1].x[i1])
                                siz1 = pp[1].n[i1++];
                        p0++;
                        p1++;
                }
        }

        /* pct homology:
         * if penalizing endgaps, base is the shorter seq
         * else, knock off overhangs and take shorter core
         */
        if (endgaps)
                lx = (len0 < len1)? len0 : len1;
        else
                lx = (lx < ly)? lx : ly;
        pct = 100.*(double)nm/(double)lx;
        fprintf(fx, "\n");
        fprintf(fx, " < %d match%s in an overlap of %d: %.2f percent similarity\n",
                nm, (nm == 1)? "" : "es", lx, pct);
```

Table 1 (cont')

```
        fprintf(fx, "<gaps in first sequence: %d", gapx);                    ...getmat
        if (gapx) {
                (void) sprintf(outx, " (%d %s%s)",
                        ngapx, (dna)? "base":"residue", (ngapx == 1)? "":"s");
 5              fprintf(fx,"%s", outx);
        fprintf(fx, ", gaps in second sequence: %d", gapy);
        if (gapy) {
                (void) sprintf(outx, " (%d %s%s)",
                        ngapy, (dna)? "base":"residue", (ngapy == 1)? "":"s");
10              fprintf(fx,"%s", outx);
        }
        if (dna)
                fprintf(fx,
                "\n<score: %d (match = %d, mismatch = %d, gap penalty = %d + %d per base)\n",
15              smax, DMAT, DMIS, DINS0, DINS1);
        else
                fprintf(fx,
                "\n<score: %d (Dayhoff PAM 250 matrix, gap penalty = %d + %d per residue)\n",
                smax, PINS0, PINS1);
20      if (endgaps)
                fprintf(fx,
                "<endgaps penalized. left endgap: %d %s%s, right endgap: %d %s%s\n",
                firstgap, (dna)? "base" : "residue", (firstgap == 1)? "" : "s",
                lastgap, (dna)? "base" : "residue", (lastgap == 1)? "" : "s");
25      else
                fprintf(fx, "<endgaps not penalized\n");
}
        static          nm;                 /* matches in core — for checking */
        static          lmax;               /* lengths of stripped file names */
30      static          ij[2];              /* jmp index for a path */
        static          nc[2];              /* number at start of current line */
        static          ni[2];              /* current elem number -- for gapping */
        static          siz[2];
        static char     *ps[2];             /* ptr to current element */
35      static char     *po[2];             /* ptr to next output char slot */
        static char     out[2][P_LINE];     /* output line */
        static char     star[P_LINE];       /* set by stars() */
        /*
        * print alignment of described in struct path pp[]
40      */
        static

        pr_align()                                                          pr_align
        {
                int             nn;         /* char count */
45              int             more;
                register        i;

                for (i = 0, lmax = 0; i < 2; i++) {
                        nn = stripname(namex[i]);
50                      if (nn > lmax)
                                lmax = nn;
                        nc[i] = 1;
                        ni[i] = 1;
                        siz[i] = ij[i] = 0;
55                      ps[i] = seqx[i];
                        po[i] = out[i];                     }
```

Table 1 (cont')

```
                     for (nn = nm = 0, more = 1; more; ) {                                    ...pr_align
                          for (i = more = 0; i < 2; i++) {
5                                 /*
                                  * do we have more of this sequence?
                                  */
                                 if (!*ps[i])
                                        continue;
                                 more++;
10                               if (pp[i].spc) {      /* leading space */
                                        *po[i]++ = ' ';
                                        pp[i].spc--;
                                 }
                                 else if (siz[i]) {    /* in a gap */
15                                      *po[i]++ = '-';
                                        siz[i]--;
                                 }
                                 else {                     /* we're putting a seq element
                                                            */
20                                      *po[i] = *ps[i];
                                        if (islower(*ps[i]))
                                              *ps[i] = toupper(*ps[i]);
                                        po[i]++;
                                        ps[i]++;
25                                      /*
                                         * are we at next gap for this seq?
                                         */
                                        if (ni[i] == pp[i].x[ij[i]]) {
                                               /*
30                                              * we need to merge all gaps
                                                * at this location
                                                */
                                               siz[i] = pp[i].n[ij[i]++];
                                               while (ni[i] == pp[i].x[ij[i]])
35                                                    siz[i] += pp[i].n[ij[i]++];
                                        }
                                        ni[i]++;
                                 }
                          }
40                        if (++nn == olen || !more && nn) {
                                 dumpblock();
                                 for (i = 0; i < 2; i++)
                                        po[i] = out[i];
                                 nn = 0;
45                        }
                     }
              }
              /*
              * dump a block of lines, including numbers, stars: pr_align()
50            */
              static
              dumpblock()                                                                     dumpblock
              {
                     register i;
55                   for (i = 0; i < 2; i++)
                          *po[i]-- = '\0';
```

259

Table 1 (cont')

...dumpblock

```
            (void) putc('\n', fx);
            for (i = 0; i < 2; i++) {
                    if (*out[i] && (*out[i] != ' ' || *(po[i]) != ' ')) {
                            if (i == 0)
                                    nums(i);
                            if (i == 0 && *out[1])
                                    stars();
                            putline(i);
                            if (i == 0 && *out[1])
                                    fprintf(fx, star);
                            if (i == 1)
                                    nums(i);

                    }
            }
    }
    /*
     * put out a number line: dumpblock()
     */
    static
    nums(ix)                                                              nums
            int        ix;        /* index in out[] holding seq line */
    {
            char            nline[P_LINE];
            register        i, j;
            register char   *pn, *px, *py;
            for (pn = nline, i = 0; i < lmax+P_SPC; i++, pn++)
                    *pn = ' ';
            for (i = nc[ix], py = out[ix]; *py; py++, pn++) {
                    if (*py == ' ' || *py == '-')
                            *pn = ' ';
                    else {
                            if (i%10 == 0 || (i == 1 && nc[ix] != 1)) {
                                    j = (i < 0)? -i : i;
                                    for (px = pn; j; j /= 10, px--)
                                            *px = j%10 + '0';
                                    if (i < 0)
                                            *px = '-';
                            }
                            else
                                    *pn = ' ';
                            i++;
                    }
            }
            *pn = '\0';
            nc[ix] = i;
            for (pn = nline; *pn; pn++)
                    (void) putc(*pn, fx);
            (void) putc('\n', fx);
    }
    /*
     * put out a line (name, [num], seq, [num]): dumpblock()
     */
    static
    putline(ix)                                                          putline
            int        ix;                          {
```

Table 1 (cont')

```
            int             i;
 5          register char   *px;

            for (px = namex[ix], i = 0; *px && *px != ':'; px++, i++)
                    (void) putc(*px, fx);
            for (; i < lmax+P_SPC; i++)
                    (void) putc(' ', fx);
10
            /* these count from 1:
             * ni[] is current element (from 1)
             * nc[] is number at start of current line
             */
15          for (px = out[ix]; *px; px++)
                    (void) putc(*px&0x7F, fx);
            (void) putc('\n', fx);
    }

20

    /*
     * put a line of stars (seqs always in out[0], out[1]); dumpblock()
     */
    static
25  stars()
    {
            int             i;
            register char   *p0, *p1, cx, *px;

30          if (!*out[0] || (*out[0] == ' ' && *(po[0]) == ' ') ||
                !*out[1] || (*out[1] == ' ' && *(po[1]) == ' '))
                    return;
            px = star;
            for (i = lmax+P_SPC; i; i--)
35                  *px++ = ' ';

            for (p0 = out[0], p1 = out[1]; *p0 && *p1; p0++, p1++) {
                    if (isalpha(*p0) && isalpha(*p1)) {

40                          if (xbm[*p0-'A']&xbm[*p1-'A']) {
                                    cx = '*';
                                    nm++;
                            }
                            else if (!dna && _day[*p0-'A'][*p1-'A'] > 0)
45                                  cx = '.';
                            else
                                    cx = ' ';
                    }
                    else
50                          cx = ' ';
                    *px++ = cx;
            }
            *px++ = '\n';
            *px = '\0';
55  }
```

261

Table 1 (cont')

```
        /*
         * strip path or prefix from pn, return len: pr_align()
         */
        static
5       stripname(pn)                                                          stripname
                char    *pn;     /* file name (may be path) */
        {
                register char   *px, *py;

10              py = 0;
                for (px = pn; *px; px++)
                        if (*px == '/')
                                py = px + 1;
                if (py)
15                      (void) strcpy(pn, py);
                return(strlen(pn));

        }

20
```

Table 1 (cont')

```
/*
 * cleanup() -- cleanup any tmp file
 * getseq() -- read in seq, set dna, len, maxlen
 * g_calloc() -- calloc() with error checkin
 * readjmps() -- get the good jmps, from tmp file if necessary
 * writejmps() -- write a filled array of jmps to a tmp file: nw()
 */
#include "nw.h"
#include <sys/file.h>

char      *jname = "/tmp/homgXXXXXX";          /* tmp file for jmps */
FILE      *fj;
int       cleanup();                            /* cleanup tmp file */
long      lseek();
/*
 * remove any tmp file if we blow
 */
cleanup(i)                                                          cleanup
          int      i;
{
          if (fj)
                   (void) unlink(jname);
          exit(i);
}
/*
 * read, return ptr to seq, set dna, len, maxlen
 * skip lines starting with ';', '<', or '>'
 * seq in upper or lower case
 */
char      *
getseq(file, len)                                                   getseq
          char     *file;     /* file name */
          int      *len;      /* seq len */
{
          char              line[1024], *pseq;
          register char     *px, *py;
          int               natgc, tlen;
          FILE              *fp;
          if ((fp = fopen(file,"r")) == 0) {
                   fprintf(stderr,"%s: can't read %s\n", prog, file);
                   exit(1);
          }
          tlen = natgc = 0;
          while (fgets(line, 1024, fp)) {
                   if (*line == ';' || *line == '<' || *line == '>')
                            continue;
                   for (px = line; *px != '\n'; px++)
                            if (isupper(*px) || islower(*px))
                                     tlen++;
          }
          if ((pseq = malloc((unsigned)(tlen+6))) == 0) {
                   fprintf(stderr,"%s: malloc() failed to get %d bytes for %s\n", prog, tlen+6, file);
                   exit(1);
          }
          pseq[0] = pseq[1] = pseq[2] = pseq[3] = '\0';
```

263

Table 1 (cont')

...getseq

```
          py = pseq + 4;
          *len = tlen;
          rewind(fp);
          while (fgets(line, 1024, fp)) {
                    if (*line == ';' || *line == '<' || *line == '>')
                              continue;
                    for (px = line; *px != '\n'; px++) {
                              if (isupper(*px))
                                        *py++ = *px;
                              else if (islower(*px))
                                        *py++ = toupper(*px);
                              if (index("ATGCU",*(py-1)))
                                        natgc++;
                    }
          }
          *py++ = '\0';
          *py = '\0';
          (void) fclose(fp);
          dna = natgc > (tlen/3);
          return(pseq+4);
}
char      *
g_calloc(msg, nx, sz)                                                g_calloc
          char      *msg;              /* program, calling routine */
          int       nx, sz;           /* number and size of elements */
{
          char                *px, *calloc();
          if ((px = calloc((unsigned)nx, (unsigned)sz)) == 0) {
                    if (*msg) {
                              fprintf(stderr, "%s: g_calloc() failed %s (n=%d, sz=%d)\n", prog, msg, nx, sz);
                              exit(1);
                    }
          }
          return(px);
}


/*
 * get final jmps from dx[] or tmp file, set pp[], reset dmax: main()
 */
readjmps()                                                          readjmps
{
          int                 fd = -1;
          int                 siz, i0, i1;
          register  i, j, xx;
          if (fj) {
                    (void) fclose(fj);
                    if ((fd = open(jname, O_RDONLY, 0)) < 0) {
                              fprintf(stderr, "%s: can't open() %s\n", prog, jname);
                              cleanup(1);
                    }
          }
          for (i = i0 = i1 = 0, dmax0 = dmax, xx = len0; ; i++) {
                    while (1) {
                              for (j = dx[dmax].ijmp; j >= 0 && dx[dmax].jp.x[j] >= xx; j--)
                                        ;
```

Table 1 (cont')

...readjmps

```
                        if (j < 0 && dx[dmax].offset && fj) {
                                (void) lseek(fd, dx[dmax].offset, 0);
                                (void) read(fd, (char *)&dx[dmax].jp, sizeof(struct jmp));
                                (void) read(fd, (char *)&dx[dmax].offset, sizeof(dx[dmax].offset));
                                dx[dmax].ijmp = MAXJMP-1;                            }
                        else
                                break;              }
                if (i >= JMPS) {
                        fprintf(stderr, "%s: too many gaps in alignment\n", prog);
                        cleanup(1);
                }
                if (j >= 0) {
                        siz = dx[dmax].jp.n[j];
                        xx = dx[dmax].jp.x[j];
                        dmax += siz;
                        if (siz < 0) {                       /* gap in second seq */
                                pp[1].n[i1] = -siz;
                                xx += siz;
                                /* id = xx - yy + len1 - 1                        */
                                pp[1].x[i1] = xx - dmax + len1 - 1;
                                gapy++;
                                ngapy -= siz;
/* ignore MAXGAP when doing endgaps */
                                siz = (-siz < MAXGAP || endgaps)? -siz : MAXGAP;
                                i1++;
                        }
                        else if (siz > 0) {  /* gap in first seq */
                                pp[0].n[i0] = siz;
                                pp[0].x[i0] = xx;
                                gapx++;
                                ngapx += siz;
/* ignore MAXGAP when doing endgaps */
                                siz = (siz < MAXGAP || endgaps)? siz : MAXGAP;
                                i0++;
                        }
                }
                else
                        break;
        }
        /* reverse the order of jmps   */
        for (j = 0, i0--; j < i0; j++, i0--) {
                i = pp[0].n[j]; pp[0].n[j] = pp[0].n[i0]; pp[0].n[i0] = i;
                i = pp[0].x[j]; pp[0].x[j] = pp[0].x[i0]; pp[0].x[i0] = i;
        }
        for (j = 0, i1--; j < i1; j++, i1--) {
                i = pp[1].n[j]; pp[1].n[j] = pp[1].n[i1]; pp[1].n[i1] = i;
                i = pp[1].x[j]; pp[1].x[j] = pp[1].x[i1]; pp[1].x[i1] = i;
        }
        if (fd >= 0)
                (void) close(fd);
        if (fj) {
                (void) unlink(jname);
                fj = 0;
                offset = 0;
        }                                       }
```

265

Table 1 (cont')

```
      /*
       * write a filled jmp struct offset of the prev one (if any): nw()
       */
5     writejmps(ix)                                                    writejmps
              int     ix;
      {
              char    *mktemp();

10            if (!fj) {
                      if (mktemp(jname) < 0) {
                              fprintf(stderr, "%s: can't mktemp() %s\n", prog, jname);
                              cleanup(1);
                      }
15                    if ((fj = fopen(jname, "w")) == 0) {
                              fprintf(stderr, "%s: can't write %s\n", prog, jname);
                              exit(1);
                      }
              }
20            (void) fwrite((char *)&dx[ix].jp, sizeof(struct jmp), 1, fj);
              (void) fwrite((char *)&dx[ix].offset, sizeof(dx[ix].offset), 1, fj);
      }
```

Table 2

| TAT | XXXXXXXXXXXXXXX | (Length = 15 amino acids) |
| Comparison Protein | XXXXXYYYYYYY | (Length = 12 amino acids) |

5   % amino acid sequence identity =

(the number of identically matching amino acid residues between the two polypeptide sequences as determined by ALIGN-2) divided by (the total number of amino acid residues of the TAT polypeptide) =

10   5 divided by 15 = 33.3%

Table 3

| | TAT | XXXXXXXXXX | (Length = 10 amino acids) |
| 15 | Comparison Protein | XXXXXYYYYYYYZZYZ | (Length = 15 amino acids) |

% amino acid sequence identity =

(the number of identically matching amino acid residues between the two polypeptide sequences as determined

20   by ALIGN-2) divided by (the total number of amino acid residues of the TAT polypeptide) =

5 divided by 10 = 50%

Table 4

25

| TAT-DNA | NNNNNNNNNNNNNN | (Length = 14 nucleotides) |
| Comparison DNA | NNNNNNLLLLLLLLLL | (Length = 16 nucleotides) |

% nucleic acid sequence identity =

30

(the number of identically matching nucleotides between the two nucleic acid sequences as determined by ALIGN-2) divided by (the total number of nucleotides of the TAT-DNA nucleic acid sequence) =
6 divided by 14 = 42.9%

Table 5

| TAT-DNA | NNNNNNNNNNNN | (Length = 12 nucleotides) |
| Comparison DNA | NNNNLLLVV | (Length = 9 nucleotides) |

5   % nucleic acid sequence identity =

(the number of identically matching nucleotides between the two nucleic acid sequences as determined by ALIGN-2) divided by (the total number of nucleotides of the TAT-DNA nucleic acid sequence) =

10   4 divided by 12 = 33.3%

II.   Compositions and Methods of the Invention

A.   Anti-TAT Antibodies

In one embodiment, the present invention provides anti-TAT antibodies which may find use herein as
15   therapeutic and/or diagnostic agents. Exemplary antibodies include polyclonal, monoclonal, humanized, bispecific, and heteroconjugate antibodies.

1.   Polyclonal Antibodies

Polyclonal antibodies are preferably raised in animals by multiple subcutaneous (sc) or intraperitoneal (ip) injections of the relevant antigen and an adjuvant. It may be useful to conjugate the relevant antigen
20   (especially when synthetic peptides are used) to a protein that is immunogenic in the species to be immunized. For example, the antigen can be conjugated to keyhole limpet hemocyanin (KLH), serum albumin, bovine thyroglobulin, or soybean trypsin inhibitor, using a bifunctional or derivatizing agent, e.g., maleimidobenzoyl sulfosuccinimide ester (conjugation through cysteine residues), N-hydroxysuccinimide (through lysine residues), glutaraldehyde, succinic anhydride, $SOCl_2$, or $R^1N=C=NR$, where R and R^1 are different alkyl groups.
25   Animals are immunized against the antigen, immunogenic conjugates, or derivatives by combining, e.g., 100 µg or 5 µg of the protein or conjugate (for rabbits or mice, respectively) with 3 volumes of Freund's complete adjuvant and injecting the solution intradermally at multiple sites. One month later, the animals are boosted with 1/5 to 1/10 the original amount of peptide or conjugate in Freund's complete adjuvant by subcutaneous injection at multiple sites. Seven to 14 days later, the animals are bled and the serum is assayed
30   for antibody titer. Animals are boosted until the titer plateaus. Conjugates also can be made in recombinant cell culture as protein fusions. Also, aggregating agents such as alum are suitably used to enhance the immune response.

2.   Monoclonal Antibodies

Monoclonal antibodies may be made using the hybridoma method first described by Kohler et al.,
35   Nature, 256:495 (1975), or may be made by recombinant DNA methods (U.S. Patent No. 4,816,567).

In the hybridoma method, a mouse or other appropriate host animal, such as a hamster, is immunized

268

as described above to elicit lymphocytes that produce or are capable of producing antibodies that will specifically bind to the protein used for immunization. Alternatively, lymphocytes may be immunized *in vitro*. After immunization, lymphocytes are isolated and then fused with a myeloma cell line using a suitable fusing agent, such as polyethylene glycol, to form a hybridoma cell (Goding, Monoclonal Antibodies: Principles and Practice, pp.59-103 (Academic Press, 1986)).

5   The hybridoma cells thus prepared are seeded and grown in a suitable culture medium which medium preferably contains one or more substances that inhibit the growth or survival of the unfused, parental myeloma cells (also referred to as fusion partner). For example, if the parental myeloma cells lack the enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT or HPRT), the selective culture medium for the hybridomas typically will include hypoxanthine, aminopterin, and thymidine (HAT medium), which substances

10   prevent the growth of HGPRT-deficient cells.

           Preferred fusion partner myeloma cells are those that fuse efficiently, support stable high-level production of antibody by the selected antibody-producing cells, and are sensitive to a selective medium that selects against the unfused parental cells. Preferred myeloma cell lines are murine myeloma lines, such as those derived from MOPC-21 and MPC-11 mouse tumors available from the Salk Institute Cell Distribution Center,

15   San Diego, California USA, and SP-2 and derivatives e.g., X63-Ag8-653 cells available from the American Type Culture Collection, Manassas, Virginia, USA. Human myeloma and mouse-human heteromyeloma cell lines also have been described for the production of human monoclonal antibodies (Kozbor, J. Immunol., 133:3001 (1984); and Brodeur et al., Monoclonal Antibody Production Techniques and Applications, pp. 51-63 (Marcel Dekker, Inc., New York, 1987)).

20   Culture medium in which hybridoma cells are growing is assayed for production of monoclonal antibodies directed against the antigen. Preferably, the binding specificity of monoclonal antibodies produced by hybridoma cells is determined by immunoprecipitation or by an *in vitro* binding assay, such as radioimmunoassay (RIA) or enzyme-linked immunosorbent assay (ELISA).

           The binding affinity of the monoclonal antibody can, for example, be determined by the Scatchard

25   analysis described in Munson et al., Anal. Biochem., 107:220 (1980).

           Once hybridoma cells that produce antibodies of the desired specificity, affinity, and/or activity are identified, the clones may be subcloned by limiting dilution procedures and grown by standard methods (Goding, Monoclonal Antibodies: Principles and Practice, pp.59-103 (Academic Press, 1986)). Suitable culture media for this purpose include, for example, D-MEM or RPMI-1640 medium. In addition, the hybridoma cells may

30   be grown *in vivo* as ascites tumors in an animal e.g,, by i.p. injection of the cells into mice.

           The monoclonal antibodies secreted by the subclones are suitably separated from the culture medium, ascites fluid, or serum by conventional antibody purification procedures such as, for example, affinity chromatography (e.g., using protein A or protein G-Sepharose) or ion-exchange chromatography, hydroxylapatite chromatography, gel electrophoresis, dialysis, etc.

35   DNA encoding the monoclonal antibodies is readily isolated and sequenced using conventional procedures (e.g., by using oligonucleotide probes that are capable of binding specifically to genes encoding the

heavy and light chains of murine antibodies). The hybridoma cells serve as a preferred source of such DNA. Once isolated, the DNA may be placed into expression vectors, which are then transfected into host cells such as *E. coli* cells, simian COS cells, Chinese Hamster Ovary (CHO) cells, or myeloma cells that do not otherwise produce antibody protein, to obtain the synthesis of monoclonal antibodies in the recombinant host cells. Review articles on recombinant expression in bacteria of DNA encoding the antibody include Skerra et al., Curr.
5   Opinion in Immunol., 5:256-262 (1993) and Plückthun, Immunol. Revs. 130:151-188 (1992).

In a further embodiment, monoclonal antibodies or antibody fragments can be isolated from antibody phage libraries generated using the techniques described in McCafferty et al., Nature, 348:552-554 (1990). Clackson et al., Nature, 352:624-628 (1991) and Marks et al., J. Mol. Biol., 222:581-597 (1991) describe the isolation of murine and human antibodies, respectively, using phage libraries. Subsequent publications describe
10   the production of high affinity (nM range) human antibodies by chain shuffling (Marks et al., Bio/Technology, 10:779-783 (1992)), as well as combinatorial infection and *in vivo* recombination as a strategy for constructing very large phage libraries (Waterhouse et al., Nuc. Acids. Res. 21:2265-2266 (1993)). Thus, these techniques are viable alternatives to traditional monoclonal antibody hybridoma techniques for isolation of monoclonal antibodies.

15   The DNA that encodes the antibody may be modified to produce chimeric or fusion antibody polypeptides, for example, by substituting human heavy chain and light chain constant domain (C$_H$ and C$_L$) sequences for the homologous murine sequences (U.S. Patent No. 4,816,567; and Morrison, et al., Proc. Natl Acad. Sci. USA, 81:6851 (1984)), or by fusing the immunoglobulin coding sequence with all or part of the coding sequence for a non-immunoglobulin polypeptide (heterologous polypeptide). The non-immunoglobulin
20   polypeptide sequences can substitute for the constant domains of an antibody, or they are substituted for the variable domains of one antigen-combining site of an antibody to create a chimeric bivalent antibody comprising one antigen-combining site having specificity for an antigen and another antigen-combining site having specificity for a different antigen.

3.   Human and Humanized Antibodies
25   The anti-TAT antibodies of the invention may further comprise humanized antibodies or human antibodies. Humanized forms of non-human (e.g., murine) antibodies are chimeric immunoglobulins, immunoglobulin chains or fragments thereof (such as Fv, Fab, Fab', F(ab')$_2$ or other antigen-binding subsequences of antibodies) which contain minimal sequence derived from non-human immunoglobulin. Humanized antibodies include human immunoglobulins (recipient antibody) in which residues from a
30   complementary determining region (CDR) of the recipient are replaced by residues from a CDR of a non-human species (donor antibody) such as mouse, rat or rabbit having the desired specificity, affinity and capacity. In some instances, Fv framework residues of the human immunoglobulin are replaced by corresponding non-human residues. Humanized antibodies may also comprise residues which are found neither in the recipient antibody nor in the imported CDR or framework sequences. In general, the humanized antibody will comprise
35   substantially all of at least one, and typically two, variable domains, in which all or substantially all of the CDR regions correspond to those of a non-human immunoglobulin and all or substantially all of the FR regions are

270

those of a human immunoglobulin consensus sequence. The humanized antibody optimally also will comprise at least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin [Jones et al., Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-329 (1988); and Presta, Curr. Op. Struct. Biol., 2:593-596 (1992)].

5   Methods for humanizing non-human antibodies are well known in the art. Generally, a humanized antibody has one or more amino acid residues introduced into it from a source which is non-human. These non-human amino acid residues are often referred to as "import" residues, which are typically taken from an "import" variable domain. Humanization can be essentially performed following the method of Winter and co-workers [Jones et al., Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-327 (1988); Verhoeyen et al., Science, 239:1534-1536 (1988)], by substituting rodent CDRs or CDR sequences for the corresponding

10   sequences of a human antibody. Accordingly, such "humanized" antibodies are chimeric antibodies (U.S. Patent No. 4,816,567), wherein substantially less than an intact human variable domain has been substituted by the corresponding sequence from a non-human species. In practice, humanized antibodies are typically human antibodies in which some CDR residues and possibly some FR residues are substituted by residues from analogous sites in rodent antibodies.

15   The choice of human variable domains, both light and heavy, to be used in making the humanized antibodies is very important to reduce antigenicity and HAMA response (human anti-mouse antibody) when the antibody is intended for human therapeutic use. According to the so-called "best-fit" method, the sequence of the variable domain of a rodent antibody is screened against the entire library of known human variable domain sequences. The human V domain sequence which is closest to that of the rodent is identified and the human

20   framework region (FR) within it accepted for the humanized antibody (Sims et al., J. Immunol. 151:2296 (1993); Chothia et al., J. Mol. Biol., 196:901 (1987)). Another method uses a particular framework region derived from the consensus sequence of all human antibodies of a particular subgroup of light or heavy chains. The same framework may be used for several different humanized antibodies (Carter et al., Proc. Natl. Acad. Sci. USA, 89:4285 (1992); Presta et al., J. Immunol. 151:2623 (1993)).

25   It is further important that antibodies be humanized with retention of high binding affinity for the antigen and other favorable biological properties. To achieve this goal, according to a preferred method, humanized antibodies are prepared by a process of analysis of the parental sequences and various conceptual humanized products using three-dimensional models of the parental and humanized sequences. Three-dimensional immunoglobulin models are commonly available and are familiar to those skilled in the art.

30   Computer programs are available which illustrate and display probable three-dimensional conformational structures of selected candidate immunoglobulin sequences. Inspection of these displays permits analysis of the likely role of the residues in the functioning of the candidate immunoglobulin sequence, i.e., the analysis of residues that influence the ability of the candidate immunoglobulin to bind its antigen. In this way, FR residues can be selected and combined from the recipient and import sequences so that the desired antibody

35   characteristic, such as increased affinity for the target antigen(s), is achieved. In general, the hypervariable region residues are directly and most substantially involved in influencing antigen binding.

Various forms of a humanized anti-TAT antibody are contemplated. For example, the humanized antibody may be an antibody fragment, such as a Fab, which is optionally conjugated with one or more cytotoxic agent(s) in order to generate an immunoconjugate. Alternatively, the humanized antibody may be an intact antibody, such as an intact IgG1 antibody.

As an alternative to humanization, human antibodies can be generated. For example, it is now possible to produce transgenic animals (e.g., mice) that are capable, upon immunization, of producing a full repertoire of human antibodies in the absence of endogenous immunoglobulin production. For example, it has been described that the homozygous deletion of the antibody heavy-chain joining region (J_H) gene in chimeric and germ-line mutant mice results in complete inhibition of endogenous antibody production. Transfer of the human germ-line immunoglobulin gene array into such germ-line mutant mice will result in the production of human antibodies upon antigen challenge. See, e.g., Jakobovits et al., Proc. Natl. Acad. Sci. USA, 90:2551 (1993); Jakobovits et al., Nature, 362:255-258 (1993); Bruggemann et al., Year in Immuno. 7:33 (1993); U.S. Patent Nos. 5,545,806, 5,569,825, 5,591,669 (all of GenPharm); 5,545,807; and WO 97/17852.

Alternatively, phage display technology (McCafferty et al., Nature 348:552-553 [1990]) can be used to produce human antibodies and antibody fragments in vitro, from immunoglobulin variable (V) domain gene repertoires from unimmunized donors. According to this technique, antibody V domain genes are cloned in-frame into either a major or minor coat protein gene of a filamentous bacteriophage, such as M13 or fd, and displayed as functional antibody fragments on the surface of the phage particle. Because the filamentous particle contains a single-stranded DNA copy of the phage genome, selections based on the functional properties of the antibody also result in selection of the gene encoding the antibody exhibiting those properties. Thus, the phage mimics some of the properties of the B-cell. Phage display can be performed in a variety of formats, reviewed in, e.g., Johnson, Kevin S. and Chiswell, David J., Current Opinion in Structural Biology 3:564-571 (1993). Several sources of V-gene segments can be used for phage display. Clackson et al. Nature, 352:624-628 (1991) isolated a diverse array of anti-oxazolone antibodies from a small random combinatorial library of V genes derived from the spleens of immunized mice. A repertoire of V genes from unimmunized human donors can be constructed and antibodies to a diverse array of antigens (including self-antigens) can be isolated essentially following the techniques described by Marks et al., J. Mol. Biol. 222:581-597 (1991), or Griffith et al., EMBO J. 12:725-734 (1993). See, also, U.S. Patent Nos. 5,565,332 and 5,573,905.

As discussed above, human antibodies may also be generated by in vitro activated B cells (see U.S. Patents 5,567,610 and 5,229,275).

4.   Antibody fragments

In certain circumstances there are advantages of using antibody fragments, rather than whole antibodies. The smaller size of the fragments allows for rapid clearance, and may lead to improved access to solid tumors.

Various techniques have been developed for the production of antibody fragments. Traditionally, these fragments were derived via proteolytic digestion of intact antibodies (see, e.g., Morimoto et al., Journal of Biochemical and Biophysical Methods 24:107-117 (1992); and Brennan et al., Science, 229:81 (1985)).

272

F(ab')$_2$ fragments. These fragments are reduced in the presence of the dithiol complexing agent, sodium arsenite, to stabilize vicinal dithiols and prevent intermolecular disulfide formation. The Fab' fragments generated are then converted to thionitrobenzoate (TNB) derivatives. One of the Fab'-TNB derivatives is then reconverted to the Fab'-thiol by reduction with mercaptoethylamine and is mixed with an equimolar amount of the other Fab'-TNB derivative to form the bispecific antibody. The bispecific antibodies produced can be used as agents for the selective immobilization of enzymes.

Recent progress has facilitated the direct recovery of Fab'-SH fragments from *E. coli*, which can be chemically coupled to form bispecific antibodies. Shalaby et al., J. Exp. Med. 175: 217-225 (1992) describe the production of a fully humanized bispecific antibody F(ab')$_2$ molecule. Each Fab' fragment was separately secreted from *E. coli* and subjected to directed chemical coupling *in vitro* to form the bispecific antibody. The bispecific antibody thus formed was able to bind to cells overexpressing the ErbB2 receptor and normal human T cells, as well as trigger the lytic activity of human cytotoxic lymphocytes against human breast tumor targets.

Various techniques for making and isolating bispecific antibody fragments directly from recombinant cell culture have also been described. For example, bispecific antibodies have been produced using leucine zippers. Kostelny et al.,J. Immunol. 148(5):1547-1553 (1992). The leucine zipper peptides from the Fos and Jun proteins were linked to the Fab' portions of two different antibodies by gene fusion. The antibody homodimers were reduced at the hinge region to form monomers and then re-oxidized to form the antibody heterodimers. This method can also be utilized for the production of antibody homodimers. The "diabody" technology described by Hollinger et al., Proc. Natl. Acad. Sci. USA 90:6444-6448 (1993) has provided an alternative mechanism for making bispecific antibody fragments. The fragments comprise a V$_H$ connected to a V$_L$ by a linker which is too short to allow pairing between the two domains on the same chain. Accordingly, the V$_H$ and V$_L$ domains of one fragment are forced to pair with the complementary V$_L$ and V$_H$ domains of another fragment, thereby forming two antigen-binding sites. Another strategy for making bispecific antibody fragments by the use of single-chain Fv (sFv) dimers has also been reported. See Gruber et al., J. Immunol., 152:5368 (1994).

Antibodies with more than two valencies are contemplated. For example, trispecific antibodies can be prepared. Tutt et al., J. Immunol. 147:60 (1991).

6.   Heteroconjugate Antibodies

Heteroconjugate antibodies are also within the scope of the present invention. Heteroconjugate antibodies are composed of two covalently joined antibodies. Such antibodies have, for example, been proposed to target immune system cells to unwanted cells [U.S. Patent No. 4,676,980], and for treatment of HIV infection [WO 91/00360; WO 92/200373; EP 03089]. It is contemplated that the antibodies may be prepared *in vitro* using known methods in synthetic protein chemistry, including those involving crosslinking agents. For example, immunotoxins may be constructed using a disulfide exchange reaction or by forming a thioether bond. Examples of suitable reagents for this purpose include iminothiolate and methyl-4-mercaptobutyrimidate and those disclosed, for example, in U.S. Patent No. 4,676,980.

7.   Multivalent Antibodies

A multivalent antibody may be internalized (and/or catabolized) faster than a bivalent antibody by a cell expressing an antigen to which the antibodies bind. The antibodies of the present invention can be multivalent antibodies (which are other than of the IgM class) with three or more antigen binding sites (e.g. tetravalent antibodies), which can be readily produced by recombinant expression of nucleic acid encoding the polypeptide chains of the antibody. The multivalent antibody can comprise a dimerization domain and three or

5   more antigen binding sites. The preferred dimerization domain comprises (or consists of) an Fc region or a hinge region. In this scenario, the antibody will comprise an Fc region and three or more antigen binding sites amino-terminal to the Fc region. The preferred multivalent antibody herein comprises (or consists of) three to about eight, but preferably four, antigen binding sites. The multivalent antibody comprises at least one polypeptide chain (and preferably two polypeptide chains), wherein the polypeptide chain(s) comprise two or

10   more variable domains. For instance, the polypeptide chain(s) may comprise VD1-(X1)$_n$-VD2-(X2)$_n$-Fc, wherein VD1 is a first variable domain, VD2 is a second variable domain, Fc is one polypeptide chain of an Fc region, X1 and X2 represent an amino acid or polypeptide, and n is 0 or 1. For instance, the polypeptide chain(s) may comprise: VH-CH1-flexible linker-VH-CH1-Fc region chain; or VH-CH1-VH-CH1-Fc region chain. The multivalent antibody herein preferably further comprises at least two (and preferably four) light chain

15   variable domain polypeptides. The multivalent antibody herein may, for instance, comprise from about two to about eight light chain variable domain polypeptides. The light chain variable domain polypeptides contemplated here comprise a light chain variable domain and, optionally, further comprise a CL domain.

8. Effector Function Engineering

It may be desirable to modify the antibody of the invention with respect to effector function, e.g., so

20   as to enhance antigen-dependent cell-mediated cyotoxicity (ADCC) and/or complement dependent cytotoxicity (CDC) of the antibody. This may be achieved by introducing one or more amino acid substitutions in an Fc region of the antibody. Alternatively or additionally, cysteine residue(s) may be introduced in the Fc region, thereby allowing interchain disulfide bond formation in this region. The homodimeric antibody thus generated may have improved internalization capability and/or increased complement-mediated cell killing and antibody-

25   dependent cellular cytotoxicity (ADCC). See Caron et al.,J. Exp Med. 176:1191-1195 (1992) and Shopes, B. J. Immunol. 148:2918-2922 (1992). Homodimeric antibodies with enhanced anti-tumor activity may also be prepared using heterobifunctional cross-linkers as described in Wolff et al., Cancer Research 53:2560-2565 (1993). Alternatively, an antibody can be engineered which has dual Fc regions and may thereby have enhanced complement lysis and ADCC capabilities. See Stevenson et al., Anti-Cancer Drug Design 3:219-230 (1989).

30   To increase the serum half life of the antibody, one may incorporate a salvage receptor binding epitope into the antibody (especially an antibody fragment) as described in U.S. Patent 5,739,277, for example. As used herein, the term "salvage receptor binding epitope" refers to an epitope of the Fc region of an IgG molecule (e.g., IgG$_1$, IgG$_2$, IgG$_3$, or IgG$_4$) that is responsible for increasing the *in vivo* serum half-life of the IgG molecule.

35   ### 9. Immunoconjugates

The invention also pertains to immunoconjugates comprising an antibody conjugated to a cytotoxic

agent such as a chemotherapeutic agent, a growth inhibitory agent, a toxin (*e.g.*, an enzymatically active toxin of bacterial, fungal, plant, or animal origin, or fragments thereof), or a radioactive isotope (*i.e.*, a radioconjugate).

Chemotherapeutic agents useful in the generation of such immunoconjugates have been described above. Enzymatically active toxins and fragments thereof that can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain, modeccin A chain, alpha-sarcin, *Aleurites fordii* proteins, dianthin proteins, *Phytolaca americana* proteins (PAPI, PAPII, and PAP-S), momordica charantia inhibitor, curcin, crotin, sapaonaria officinalis inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin, and the tricothecenes. A variety of radionuclides are available for the production of radioconjugated antibodies. Examples include ^{212}Bi, ^{131}I, ^{131}In, ^{90}Y, and ^{186}Re. Conjugates of the antibody and cytotoxic agent are made using a variety of bifunctional protein-coupling agents such as N-succinimidyl-3-(2-pyridyldithiol) propionate (SPDP), iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutareldehyde), bis-azido compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a ricin immunotoxin can be prepared as described in Vitetta *et al.*, Science, 238: 1098 (1987). Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026.

Conjugates of an antibody and one or more small molecule toxins, such as a calicheamicin, maytansinoids, a trichothene, and CC1065, and the derivatives of these toxins that have toxin activity, are also contemplated herein.

Maytansine and maytansinoids

In one preferred embodiment, an anti-TAT antibody (full length or fragments) of the invention is conjugated to one or more maytansinoid molecules.

Maytansinoids are mitototic inhibitors which act by inhibiting tubulin polymerization. Maytansine was first isolated from the east African shrub *Maytenus serrata* (U.S. Patent No. 3,896,111). Subsequently, it was discovered that certain microbes also produce maytansinoids, such as maytansinol and C-3 maytansinol esters (U.S. Patent No. 4,151,042). Synthetic maytansinol and derivatives and analogues thereof are disclosed, for example, in U.S. Patent Nos. 4,137,230; 4,248,870; 4,256,746; 4,260,608; 4,265,814; 4,294,757; 4,307,016; 4,308,268; 4,308,269; 4,309,428; 4,313,946; 4,315,929; 4,317,821; 4,322,348; 4,331,598; 4,361,650; 4,364,866; 4,424,219; 4,450,254; 4,362,663; and 4,371,533, the disclosures of which are hereby expressly incorporated by reference.

Maytansinoid-antibody conjugates

In an attempt to improve their therapeutic index, maytansine and maytansinoids have been conjugated to antibodies specifically binding to tumor cell antigens. Immunoconjugates containing maytansinoids and their therapeutic use are disclosed, for example, in U.S. Patent Nos. 5,208,020, 5,416,064 and European Patent EP

0 425 235 B1, the disclosures of which are hereby expressly incorporated by reference. Liu et al.,Proc. Natl. Acad. Sci. USA 93:8618-8623 (1996) described immunoconjugates comprising a maytansinoid designated DM1 linked to the monoclonal antibody C242 directed against human colorectal cancer. The conjugate was found to be highly cytotoxic towards cultured colon cancer cells, and showed antitumor activity in an *in vivo* tumor growth assay. Chari et al., Cancer Research 52:127-131 (1992) describe immunoconjugates in which a

5   maytansinoid was conjugated via a disulfide linker to the murine antibody A7 binding to an antigen on human colon cancer cell lines, or to another murine monoclonal antibody TA.1 that binds the HER-2/*neu* oncogene. The cytotoxicity of the TA.1-maytansonoid conjugate was tested *in vitro* on the human breast cancer cell line SK-BR-3, which expresses 3×10^5 HER-2 surface antigens per cell. The drug conjugate achieved a degree of cytotoxicity similar to the free maytansonid drug, which could be increased by increasing the number of

10   maytansinoid molecules per antibody molecule. The A7-maytansinoid conjugate showed low systemic cytotoxicity in mice.

Anti-TAT polypeptide antibody-maytansinoid conjugates (immunoconjugates)

Anti-TAT antibody-maytansinoid conjugates are prepared by chemically linking an anti-TAT antibody to a maytansinoid molecule without significantly diminishing the biological activity of either the antibody or the

15   maytansinoid molecule. An average of 3-4 maytansinoid molecules conjugated per antibody molecule has shown efficacy in enhancing cytotoxicity of target cells without negatively affecting the function or solubility of the antibody, although even one molecule of toxin/antibody would be expected to enhance cytotoxicity over the use of naked antibody. Maytansinoids are well known in the art and can be synthesized by known techniques or isolated from natural sources. Suitable maytansinoids are disclosed, for example, in U.S. Patent No.

20   5,208,020 and in the other patents and nonpatent publications referred to hereinabove. Preferred maytansinoids are maytansinol and maytansinol analogues modified in the aromatic ring or at other positions of the maytansinol molecule, such as various maytansinol esters.

There are many linking groups known in the art for making antibody-maytansinoid conjugates, including, for example, those disclosed in U.S. Patent No. 5,208,020 or EP Patent 0 425 235 B1, and Chari

25   et al., Cancer Research 52:127-131 (1992). The linking groups include disufide groups, thioether groups, acid labile groups, photolabile groups, peptidase labile groups, or esterase labile groups, as disclosed in the above- identified patents, disulfide and thioether groups being preferred.

Conjugates of the antibody and maytansinoid may be made using a variety of bifunctional protein coupling agents such as N-succinimidyl-3-(2-pyridyldithio) propionate (SPDP), succinimidyl-4-(N-

30   maleimidomethyl) cyclohexane-1-carboxylate, iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutareldehyde), bis-azido compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as toluene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). Particularly preferred coupling agents

35   include N-succinimidyl-3-(2-pyridyldithio) propionate (SPDP) (Carlsson et al.Biochem. J. 173:723-737 [1978]) and N-succinimidyl-4-(2-pyridylthio)pentanoate (SPP) to provide for a disulfide linkage.

278

The linker may be attached to the maytansinoid molecule at various positions, depending on the type of the link. For example, an ester linkage may be formed by reaction with a hydroxyl group using conventional coupling techniques. The reaction may occur at the C-3 position having a hydroxyl group, the C-14 position modified with hyrdoxymethyl, the C-15 position modified with a hydroxyl group, and the C-20 position having a hydroxyl group. In a preferred embodiment, the linkage is formed at the C-3 position of maytansinol or a maytansinol analogue.

Calicheamicin

Another immunoconjugate of interest comprises an anti-TAT antibody conjugated to one or more calicheamicin molecules. The calicheamicin family of antibiotics are capable of producing double-stranded DNA breaks at sub-picomolar concentrations. For the preparation of conjugates of the calicheamicin family, see U.S. patents 5,712,374, 5,714,586, 5,739,116, 5,767,285, 5,770,701, 5,770,710, 5,773,001, 5,877,296 (all to American Cyanamid Company). Structural analogues of calicheamicin which may be used include, but are not limited to, γ_1^I, α_2^I, α_3^I, N-acetyl-γ_1^I, PSAG and θ_1^I (Hinman et al., Cancer Research 53:3336-3342 (1993), Lode et al., Cancer Research 58:2925-2928 (1998) and the aforementioned U.S. patents to American Cyanamid). Another anti-tumor drug that the antibody can be conjugated is QFA which is an antifolate. Both calicheamicin and QFA have intracellular sites of action and do not readily cross the plasma membrane. Therefore, cellular uptake of these agents through antibody mediated internalization greatly enhances their cytotoxic effects.

Other cytotoxic agents

Other antitumor agents that can be conjugated to the anti-TAT antibodies of the invention include BCNU, streptozoicin, vincristine and 5-fluorouracil, the family of agents known collectively LL-E33288 complex described in U.S. patents 5,053,394, 5,770,710, as well as esperamicins (U.S. patent 5,877,296).

Enzymatically active toxins and fragments thereof which can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain, modeccin A chain, alpha-sarcin, *Aleurites fordii* proteins, dianthin proteins, *Phytolaca americana* proteins (PAPI, PAPII, and PAP-S), momordica charantia inhibitor, curcin, crotin, sapaonaria officinalis inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin and the tricothecenes. See, for example, WO 93/21232 published October 28, 1993.

The present invention further contemplates an immunoconjugate formed between an antibody and a compound with nucleolytic activity (e.g., a ribonuclease or a DNA endonuclease such as a deoxyribonuclease; DNase).

For selective destruction of the tumor, the antibody may comprise a highly radioactive atom. A variety of radioactive isotopes are available for the production of radioconjugated anti-TAT antibodies. Examples include At^{211}, I^{131}, I^{125}, Y^{90}, Re^{186}, Re^{188}, Sm^{153}, Bi^{212}, P^{32}, Pb^{212} and radioactive isotopes of Lu. When the conjugate is used for diagnosis, it may comprise a radioactive atom for scintigraphic studies, for example tc^{99m} or I^{123}, or a spin label for nuclear magnetic resonance (NMR) imaging (also known as magnetic resonance

279

imaging, mri), such as iodine-123 again, iodine-131, indium-111, fluorine-19, carbon-13, nitrogen-15, oxygen-17, gadolinium, manganese or iron.

The radio- or other labels may be incorporated in the conjugate in known ways. For example, the peptide may be biosynthesized or may be synthesized by chemical amino acid synthesis using suitable amino acid precursors involving, for example, fluorine-19 in place of hydrogen. Labels such as tc^{99m} or I^{123}, $.Re^{186}$,

5   Re^{188} and In^{111} can be attached via a cysteine residue in the peptide. Yttrium-90 can be attached via a lysine residue. The IODOGEN method (Fraker et al (1978) Biochem. Biophys. Res. Commun. 80: 49-57 can be used to incorporate iodine-123. "Monoclonal Antibodies in Immunoscintigraphy" (Chatal,CRC Press 1989) describes other methods in detail.

Conjugates of the antibody and cytotoxic agent may be made using a variety of bifunctional protein

10   coupling agents such as N-succinimidyl-3-(2-pyridyldithio) propionate (SPDP), succinimidyl-4-(N-maleimidomethyl) cyclohexane-1-carboxylate, iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutareldehyde), bis-azido compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-

15   active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a ricin immunotoxin can be prepared as described in Vitetta et al., Science 238:1098 (1987). Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026. The linker may be a "cleavable linker" facilitating release of the cytotoxic drug in the cell. For example, an acid-labile linker, peptidase-sensitive linker, photolabile

20   linker, dimethyl linker or disulfide-containing linker (Chari et al., Cancer Research 52:127-131 (1992); U.S. Patent No. 5,208,020) may be used.

Alternatively, a fusion protein comprising the anti-TAT antibody and cytotoxic agent may be made, e.g., by recombinant techniques or peptide synthesis. The length of DNA may comprise respective regions encoding the two portions of the conjugate either adjacent one another or separated by a region encoding a linker

25   peptide which does not destroy the desired properties of the conjugate.

In yet another embodiment, the antibody may be conjugated to a "receptor" (such streptavidin) for utilization in tumor pre-targeting wherein the antibody-receptor conjugate is administered to the patient, followed by removal of unbound conjugate from the circulation using a clearing agent and then administration of a "ligand" (e.g., avidin) which is conjugated to a cytotoxic agent (e.g., a radionucleotide).

30   10.   Immunoliposomes

The anti-TAT antibodies disclosed herein may also be formulated as immunoliposomes. A "liposome" is a small vesicle composed of various types of lipids, phospholipids and/or surfactant which is useful for delivery of a drug to a mammal. The components of the liposome are commonly arranged in a bilayer formation, similar to the lipid arrangement of biological membranes. Liposomes containing the antibody are

35   prepared by methods known in the art, such as described in Epstein et al., Proc. Natl. Acad. Sci. USA 82:3688 (1985); Hwang et al., Proc. Natl Acad. Sci. USA 77:4030 (1980); U.S. Pat. Nos. 4,485,045 and 4,544,545;

and WO97/38731 published October 23, 1997. Liposomes with enhanced circulation time are disclosed in U.S. Patent No. 5,013,556.

Particularly useful liposomes can be generated by the reverse phase evaporation method with a lipid composition comprising phosphatidylcholine, cholesterol and PEG-derivatized phosphatidylethanolamine (PEG-PE). Liposomes are extruded through filters of defined pore size to yield liposomes with the desired diameter.

5   Fab' fragments of the antibody of the present invention can be conjugated to the liposomes as described in Martin et al., J. Biol. Chem. 257:286-288 (1982) via a disulfide interchange reaction. A chemotherapeutic agent is optionally contained within the liposome. See Gabizon et al., J. National Cancer Inst. 81(19):1484 (1989).

B.   TAT Binding Oligopeptides

10   TAT binding oligopeptides of the present invention are oligopeptides that bind, preferably specifically, to a TAT polypeptide as described herein. TAT binding oligopeptides may be chemically synthesized using known oligopeptide synthesis methodology or may be prepared and purified using recombinant technology. TAT binding oligopeptides are usually at least about 5 amino acids in length, alternatively at least about 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36,

15   37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or 100 amino acids in length or more, wherein such oligopeptides that are capable of binding, preferably specifically, to a TAT polypeptide as described herein. TAT binding oligopeptides may be identified without undue experimentation using well known techniques. In this regard, it is noted that

20   techniques for screening oligopeptide libraries for oligopeptides that are capable of specifically binding to a polypeptide target are well known in the art (see, e.g., U.S. Patent Nos. 5,556,762, 5,750,373, 4,708,871, 4,833,092, 5,223,409, 5,403,484, 5,571,689, 5,663,143; PCT Publication Nos. WO 84/03506 and WO84/03564; Geysen et al., Proc. Natl. Acad. Sci. U.S.A., 81:3998-4002 (1984); Geysen et al., Proc. Natl. Acad. Sci. U.S.A., 82:178-182 (1985); Geysen et al., in Synthetic Peptides as Antigens, 130-149 (1986);

25   Geysen et al., J. Immunol. Meth., 102:259-274 (1987); Schoofs et al., J. Immunol., 140:611-616 (1988), Cwirla, S. E. et al. (1990) Proc. Natl. Acad. Sci. USA, 87:6378; Lowman, H.B. et al. (1991) Biochemistry, 30:10832; Clackson, T. et al. (1991) Nature, 352: 624; Marks, J. D. et al. (1991), J. Mol. Biol., 222:581; Kang, A.S. et al. (1991) Proc. Natl. Acad. Sci. USA, 88:8363, and Smith, G. P. (1991) Current Opin. Biotechnol., 2:668).

30   In this regard, bacteriophage (phage) display is one well known technique which allows one to screen large oligopeptide libraries to identify member(s) of those libraries which are capable of specifically binding to a polypeptide target. Phage display is a technique by which variant polypeptides are displayed as fusion proteins to the coat protein on the surface of bacteriophage particles (Scott, J.K. and Smith, G. P. (1990) Science 249: 386). The utility of phage display lies in the fact that large libraries of selectively randomized

35   protein variants (or randomly cloned cDNAs) can be rapidly and efficiently sorted for those sequences that bind to a target molecule with high affinity. Display of peptide (Cwirla, S. E. et al. (1990) Proc. Natl. Acad. Sci.

281

that are capable of binding, preferably specifically, to a TAT polypeptide as described herein may be identified without undue experimentation using well known techniques. In this regard, it is noted that techniques for screening organic molecule libraries for molecules that are capable of binding to a polypeptide target are well known in the art (see, e.g., PCT Publication Nos. WO00/00823 and WO00/39585). TAT binding organic molecules may be, for example, aldehydes, ketones, oximes, hydrazones, semicarbazones, carbazides, primary

5   amines, secondary amines, tertiary amines, N-substituted hydrazines, hydrazides, alcohols, ethers, thiols, thioethers, disulfides, carboxylic acids, esters, amides, ureas, carbamates, carbonates, ketals, thioketals, acetals, thioacetals, aryl halides, aryl sulfonates, alkyl halides, alkyl sulfonates, aromatic compounds, heterocyclic compounds, anilines, alkenes, alkynes, diols, amino alcohols, oxazolidines, oxazolines, thiazolidines, thiazolines, enamines, sulfonamides, epoxides, aziridines, isocyanates, sulfonyl chlorides, diazo compounds,

10   acid chlorides, or the like.

D.   Screening for Anti-TAT Antibodies, TAT Binding Oligopeptides and TAT Binding Organic Molecules With the Desired Properties

Techniques for generating antibodies, oligopeptides and organic molecules that bind to TAT polypeptides have been described above. One may further select antibodies, oligopeptides or other organic

15   molecules with certain biological characteristics, as desired.

The growth inhibitory effects of an anti-TAT antibody, oligopeptide or other organic molecule of the invention may be assessed by methods known in the art, e.g., using cells which express a TAT polypeptide either endogenously or following transfection with the TAT gene. For example, appropriate tumor cell lines and TAT-transfected cells may treated with an anti-TAT monoclonal antibody, oligopeptide or other organic

20   molecule of the invention at various concentrations for a few days (e.g., 2-7) days and stained with crystal violet or MTT or analyzed by some other colorimetric assay. Another method of measuring proliferation would be by comparing ^{3}H-thymidine uptake by the cells treated in the presence or absence an anti-TAT antibody, TAT binding oligopeptide or TAT binding organic molecule of the invention. After treatment, the cells are harvested and the amount of radioactivity incorporated into the DNA quantitated in a scintillation counter. Appropriate

25   positive controls include treatment of a selected cell line with a growth inhibitory antibody known to inhibit growth of that cell line. Growth inhibition of tumor cells in vivo can be determined in various ways known in the art. Preferably, the tumor cell is one that overexpresses a TAT polypeptide. Preferably, the anti-TAT antibody, TAT binding oligopeptide or TAT binding organic molecule will inhibit cell proliferation of a TAT-expressing tumor cell in vitro or in vivo by about 25-100% compared to the untreated tumor cell, more

30   preferably, by about 30-100%, and even more preferably by about 50-100% or 70-100%, in one embodiment, at an antibody concentration of about 0.5 to 30 μg/ml. Growth inhibition can be measured at an antibody concentration of about 0.5 to 30 μg/ml or about 0.5 nM to 200 nM in cell culture, where the growth inhibition is determined 1-10 days after exposure of the tumor cells to the antibody. The antibody is growth inhibitory in vivo if administration of the anti-TAT antibody at about 1 μg/kg to about 100 mg/kg body weight results in

35   reduction in tumor size or reduction of tumor cell proliferation within about 5 days to 3 months from the first administration of the antibody, preferably within about 5 to 30 days.

283

USA, 87:6378) or protein (Lowman, H.B. et al. (1991) Biochemistry, 30:10832; Clackson, T. et al. (1991) Nature, 352: 624; Marks, J. D. et al. (1991), J. Mol. Biol., 222:581; Kang, A.S. et al. (1991) Proc. Natl. Acad. Sci. USA, 88:8363) libraries on phage have been used for screening millions of polypeptides or oligopeptides for ones with specific binding properties (Smith, G. P. (1991) Current Opin. Biotechnol., 2:668). Sorting phage libraries of random mutants requires a strategy for constructing and propagating a large number

5   of variants, a procedure for affinity purification using the target receptor, and a means of evaluating the results of binding enrichments. U.S. Patent Nos. 5,223,409, 5,403,484, 5,571,689, and 5,663,143.

Although most phage display methods have used filamentous phage, lambdoid phage display systems (WO 95/34683; U.S. 5,627,024), T4 phage display systems (Ren, Z-J. et al. (1998) Gene 215:439; Zhu, Z. (1997) CAN 33:534; Jiang, J. et al. (1997) can 128:44380; Ren, Z-J. et al. (1997) CAN 127:215644; Ren, Z-J.

10   (1996) Protein Sci. 5:1833; Efimov, V. P. et al. (1995) Virus Genes 10:173) and T7 phage display systems (Smith, G. P. and Scott, J.K. (1993) Methods in Enzymology, 217, 228–257; U.S. 5,766,905) are also known.

Many other improvements and variations of the basic phage display concept have now been developed. These improvements enhance the ability of display systems to screen peptide libraries for binding to selected target molecules and to display functional proteins with the potential of screening these proteins for desired

15   properties. Combinatorial reaction devices for phage display reactions have been developed (WO 98/14277) and phage display libraries have been used to analyze and control bimolecular interactions (WO 98/20169; WO 98/20159) and properties of constrained helical peptides (WO 98/20036). WO 97/35196 describes a method of isolating an affinity ligand in which a phage display library is contacted with one solution in which the ligand will bind to a target molecule and a second solution in which the affinity ligand will not bind to the target

20   molecule, to selectively isolate binding ligands. WO 97/46251 describes a method of biopanning a random phage display library with an affinity purified antibody and then isolating binding phage, followed by a micropanning process using microplate wells to isolate high affinity binding phage. The use of *Staphylococcus aureus* protein A as an affinity tag has also been reported (Li et al. (1998) Mol Biotech., 9:187). WO 97/47314 describes the use of substrate subtraction libraries to distinguish enzyme specificities using a combinatorial

25   library which may be a phage display library. A method for selecting enzymes suitable for use in detergents using phage display is described in WO 97/09446. Additional methods of selecting specific binding proteins are described in U.S. Patent Nos. 5,498,538, 5,432,018, and WO 98/15833.

Methods of generating peptide libraries and screening these libraries are also disclosed in U.S. Patent Nos. 5,723,286, 5,432,018, 5,580,717, 5,427,908, 5,498,530, 5,770,434, 5,734,018, 5,698,426, 5,763,192,

30   and 5,723,323.

C.   TAT Binding Organic Molecules

TAT binding organic molecules are organic molecules other than oligopeptides or antibodies as defined herein that bind, preferably specifically, to a TAT polypeptide as described herein. TAT binding organic molecules may be identified and chemically synthesized using known methodology (see, e.g., PCT Publication

35   Nos. WO00/00823 and WO00/39585). TAT binding organic molecules are usually less than about 2000 daltons in size, alternatively less than about 1500, 750, 500, 250 or 200 daltons in size, wherein such organic molecules

282

To select for an anti-TAT antibody, TAT binding oligopeptide or TAT binding organic molecule which induces cell death, loss of membrane integrity as indicated by, e.g., propidium iodide (PI), trypan blue or 7AAD uptake may be assessed relative to control. A PI uptake assay can be performed in the absence of complement and immune effector cells. TAT polypeptide-expressing tumor cells are incubated with medium alone or medium containing the appropriate anti-TAT antibody (e.g, at about 10 µg/ml), TAT binding oligopeptide or

5   TAT binding organic molecule. The cells are incubated for a 3 day time period. Following each treatment, cells are washed and aliquoted into 35 mm strainer-capped 12 x 75 tubes (1ml per tube, 3 tubes per treatment group) for removal of cell clumps. Tubes then receive PI (10   µg/ml). Samples may be analyzed using a FACSCAN® flow cytometer and FACSCONVERT® CellQuest software (Becton Dickinson). Those anti-TAT antibodies, TAT binding oligopeptides or TAT binding organic molecules that induce statistically significant

10   levels of cell death as determined by PI uptake may be selected as cell death-inducing anti-TAT antibodies, TAT binding oligopeptides or TAT binding organic molecules.

To screen for antibodies, oligopeptides or other organic molecules which bind to an epitope on a TAT polypeptide bound by an antibody of interest, a routine cross-blocking assay such as that described in Antibodies, A Laboratory Manual, Cold Spring Harbor Laboratory, Ed Harlow and David Lane (1988), can

15   be performed. This assay can be used to determine if a test antibody, oligopeptide or other organic molecule binds the same site or epitope as a known anti-TAT antibody. Alternatively, or additionally, epitope mapping can be performed by methods known in the art . For example, the antibody sequence can be mutagenized such as by alanine scanning, to identify contact residues. The mutant antibody is initailly tested for binding with polyclonal antibody to ensure proper folding. In a different method, peptides corresponding to different regions

20   of a TAT polypeptide can be used in competition assays with the test antibodies or with a test antibody and an antibody with a characterized or known epitope.

E.   Antibody Dependent Enzyme Mediated Prodrug Therapy (ADEPT)

The antibodies of the present invention may also be used in ADEPT by conjugating the antibody to a prodrug-activating enzyme which converts a prodrug (e.g., a peptidyl chemotherapeutic agent, see

25   WO81/01145) to an active anti-cancer drug. See, for example, WO 88/07378 and U.S. Patent No. 4,975,278.

The enzyme component of the immunoconjugate useful for ADEPT includes any enzyme capable of acting on a prodrug in such a way so as to covert it into its more active, cytotoxic form.

Enzymes that are useful in the method of this invention include, but are not limited to, alkaline phosphatase useful for converting phosphate-containing prodrugs into free drugs; arylsulfatase useful for

30   converting sulfate-containing prodrugs into free drugs; cytosine deaminase useful for converting non-toxic 5-fluorocytosine into the anti-cancer drug, 5-fluorouracil; proteases, such as serratia protease, thermolysin, subtilisin, carboxypeptidases and cathepsins (such as cathepsins B and L), that are useful for converting peptide-containing prodrugs into free drugs; D-alanylcarboxypeptidases, useful for converting prodrugs that contain D-amino acid substituents; carbohydrate-cleaving enzymes such as β-galactosidase and neuraminidase useful for

35   converting glycosylated prodrugs into free drugs; β-lactamase useful for converting drugs derivatized with β-lactams into free drugs; and penicillin amidases, such as penicillin V amidase or penicillin G amidase, useful

284

for converting drugs derivatized at their amine nitrogens with phenoxyacetyl or phenylacetyl groups, respectively, into free drugs. Alternatively, antibodies with enzymatic activity, also known in the art as "abzymes", can be used to convert the prodrugs of the invention into free active drugs (see, e.g., Massey, Nature 328:457-458 (1987)). Antibody-abzyme conjugates can be prepared as described herein for delivery of the abzyme to a tumor cell population.

5   The enzymes of this invention can be covalently bound to the anti-TAT antibodies by techniques well known in the art such as the use of the heterobifunctional crosslinking reagents discussed above. Alternatively, fusion proteins comprising at least the antigen binding region of an antibody of the invention linked to at least a functionally active portion of an enzyme of the invention can be constructed using recombinant DNA techniques well known in the art (see, e.g., Neuberger et al., Nature 312:604-608 (1984).

10   F.   Full-Length TAT Polypeptides

The present invention also provides newly identified and isolated nucleotide sequences encoding polypeptides referred to in the present application as TAT polypeptides. In particular, cDNAs (partial and full-length) encoding various TAT polypeptides have been identified and isolated, as disclosed in further detail in the Examples below.

15   As disclosed in the Examples below, various cDNA clones have been deposited with the ATCC. The actual nucleotide sequences of those clones can readily be determined by the skilled artisan by sequencing of the deposited clone using routine methods in the art. The predicted amino acid sequence can be determined from the nucleotide sequence using routine skill. For the TAT polypeptides and encoding nucleic acids described herein, in some cases, Applicants have identified what is believed to be the reading frame best

20 identifiable with the sequence information available at the time.

       G.   Anti-TAT Antibody and TAT Polypeptide Variants

In addition to the anti-TAT antibodies and full-length native sequence TAT polypeptides described herein, it is contemplated that anti-TAT antibody and TAT polypeptide variants can be prepared. Anti-TAT antibody and TAT polypeptide variants can be prepared by introducing appropriate nucleotide changes into the

25 encoding DNA, and/or by synthesis of the desired antibody or polypeptide. Those skilled in the art will appreciate that amino acid changes may alter post-translational processes of the anti-TAT antibody or TAT polypeptide, such as changing the number or position of glycosylation sites or altering the membrane anchoring characteristics.

Variations in the anti-TAT antibodies and TAT polypeptides described herein, can be made, for

30 example, using any of the techniques and guidelines for conservative and non-conservative mutations set forth, for instance, in U.S. Patent No. 5,364,934. Variations may be a substitution, deletion or insertion of one or more codons encoding the antibody or polypeptide that results in a change in the amino acid sequence as compared with the native sequence antibody or polypeptide. Optionally the variation is by substitution of at least one amino acid with any other amino acid in one or more of the domains of the anti-TAT antibody or TAT

35 polypeptide. Guidance in determining which amino acid residue may be inserted, substituted or deleted without adversely affecting the desired activity may be found by comparing the sequence of the anti-TAT antibody or

<div align="center">285</div>

TAT polypeptide with that of homologous known protein molecules and minimizing the number of amino acid sequence changes made in regions of high homology. Amino acid substitutions can be the result of replacing one amino acid with another amino acid having similar structural and/or chemical properties, such as the replacement of a leucine with a serine, i.e., conservative amino acid replacements. Insertions or deletions may optionally be in the range of about 1 to 5 amino acids. The variation allowed may be determined by

5 systematically making insertions, deletions or substitutions of amino acids in the sequence and testing the resulting variants for activity exhibited by the full-length or mature native sequence.

Anti-TAT antibody and TAT polypeptide fragments are provided herein. Such fragments may be truncated at the N-terminus or C-terminus, or may lack internal residues, for example, when compared with a full length native antibody or protein. Certain fragments lack amino acid residues that are not essential for

10 a desired biological activity of the anti-TAT antibody or TAT polypeptide.

Anti-TAT antibody and TAT polypeptide fragments may be prepared by any of a number of conventional techniques. Desired peptide fragments may be chemically synthesized. An alternative approach involves generating antibody or polypeptide fragments by enzymatic digestion, e.g., by treating the protein with an enzyme known to cleave proteins at sites defined by particular amino acid residues, or by digesting the DNA

15 with suitable restriction enzymes and isolating the desired fragment. Yet another suitable technique involves isolating and amplifying a DNA fragment encoding a desired antibody or polypeptide fragment, by polymerase chain reaction (PCR). Oligonucleotides that define the desired termini of the DNA fragment are employed at the 5' and 3' primers in the PCR. Preferably, anti-TAT antibody and TAT polypeptide fragments share at least one biological and/or immunological activity with the native anti-TAT antibody or TAT polypeptide disclosed

20 herein.

In particular embodiments, conservative substitutions of interest are shown in Table 6 under the heading of preferred substitutions. If such substitutions result in a change in biological activity, then more substantial changes, denominated exemplary substitutions in Table 6, or as further described below in reference to amino acid classes, are introduced and the products screened.

286

Table 6

Original Residue	Exemplary Substitutions	Preferred Substitutions
Ala (A)	val; leu; ile	val
Arg (R)	lys; gln; asn	lys
Asn (N)	gln; his; lys; arg	gln
Asp (D)	glu	glu
Cys (C)	ser	ser
Gln (Q)	asn	asn
Glu (E)	asp	asp
Gly (G)	pro; ala	ala
His (H)	asn; gln; lys; arg	arg
Ile (I)	leu; val; met; ala; phe; norleucine	leu
Leu (L)	norleucine; ile; val; met; ala; phe	ile
Lys (K)	arg; gln; asn	arg
Met (M)	leu; phe; ile	leu
Phe (F)	leu; val; ile; ala; tyr	leu
Pro (P)	ala	ala
Ser (S)	thr	thr
Thr (T)	ser	ser
Trp (W)	tyr; phe	tyr
Tyr (Y)	trp; phe; thr; ser	phe
Val (V)	ile; leu; met; phe; ala; norleucine	leu

Substantial modifications in function or immunological identity of the anti-TAT antibody or TAT polypeptide are accomplished by selecting substitutions that differ significantly in their effect on maintaining (a) the structure of the polypeptide backbone in the area of the substitution, for example, as a sheet or helical conformation, (b) the charge or hydrophobicity of the molecule at the target site, or (c) the bulk of the side chain. Naturally occurring residues are divided into groups based on common side-chain properties:

(1) hydrophobic: norleucine, met, ala, val, leu, ile;

(2) neutral hydrophilic: cys, ser, thr;

(3) acidic: asp, glu;

(4) basic: asn, gln, his, lys, arg;

(5) residues that influence chain orientation: gly, pro; and

(6) aromatic: trp, tyr, phe.

Non-conservative substitutions will entail exchanging a member of one of these classes for another class. Such substituted residues also may be introduced into the conservative substitution sites or, more preferably, into the remaining (non-conserved) sites.

The variations can be made using methods known in the art such as oligonucleotide-mediated (site-directed) mutagenesis, alanine scanning, and PCR mutagenesis. Site-directed mutagenesis [Carter et al. Nucl. Acids Res., 13:4331 (1986); Zoller et al., Nucl. Acids Res., 10:6487 (1987)], cassette mutagenesis [Wells et al., Gene, 34:315 (1985)], restriction selection mutagenesis [Wells et al., Philos. Trans. R. Soc. London SerA, 317:415 (1986)] or other known techniques can be performed on the cloned DNA to produce the anti-TAT antibody or TAT polypeptide variant DNA.

Scanning amino acid analysis can also be employed to identify one or more amino acids along a contiguous sequence. Among the preferred scanning amino acids are relatively small, neutral amino acids. Such amino acids include alanine, glycine, serine, and cysteine. Alanine is typically a preferred scanning amino acid among this group because it eliminates the side-chain beyond the beta-carbon and is less likely to alter the main-chain conformation of the variant [Cunningham and Wells, Science, 244:1081-1085 (1989)]. Alanine is also typically preferred because it is the most common amino acid. Further, it is frequently found in both buried and exposed positions [Creighton, The Proteins, (W.H. Freeman & Co., N.Y.); Chothia, J. Mol. Biol., 150:1 (1976)]. If alanine substitution does not yield adequate amounts of variant, an isoteric amino acid can be used.

Any cysteine residue not involved in maintaining the proper conformation of the anti-TAT antibody or TAT polypeptide also may be substituted, generally with serine, to improve the oxidative stability of the molecule and prevent aberrant crosslinking. Conversely, cysteine bond(s) may be added to the anti-TAT antibody or TAT polypeptide to improve its stability (particularly where the antibody is an antibody fragment such as an Fv fragment).

A particularly preferred type of substitutional variant involves substituting one or more hypervariable region residues of a parent antibody (e.g., a humanized or human antibody). Generally, the resulting variant(s) selected for further development will have improved biological properties relative to the parent antibody from which they are generated. A convenient way for generating such substitutional variants involves affinity maturation using phage display. Briefly, several hypervariable region sites (e.g., 6-7 sites) are mutated to generate all possible amino substitutions at each site. The antibody variants thus generated are displayed in a monovalent fashion from filamentous phage particles as fusions to the gene III product of M13 packaged within each particle. The phage-displayed variants are then screened for their biological activity (e.g., binding affinity) as herein disclosed. In order to identify candidate hypervariable region sites for modification, alanine scanning mutagenesis can be performed to identify hypervariable region residues contributing significantly to antigen binding. Alternatively, or additionally, it may be beneficial to analyze a crystal structure of the antigen-antibody complex to identify contact points between the antibody and human TAT polypeptide. Such contact residues and neighboring residues are candidates for substitution according to the techniques elaborated herein. Once such variants are generated, the panel of variants is subjected to screening as described herein and antibodies with superior properties in one or more relevant assays may be selected for further development.

Nucleic acid molecules encoding amino acid sequence variants of the anti-TAT antibody are prepared by a variety of methods known in the art. These methods include, but are not limited to, isolation from a natural source (in the case of naturally occurring amino acid sequence variants) or preparation by oligonucleotide-

288

mediated (or site-directed) mutagenesis, PCR mutagenesis, and cassette mutagenesis of an earlier prepared variant or a non-variant version of the anti-TAT antibody.

H.   Modifications of Anti-TAT Antibodies and TAT Polypeptides

Covalent modifications of anti-TAT antibodies and TAT polypeptides are included within the scope of this invention. One type of covalent modification includes reacting targeted amino acid residues of an anti-TAT antibody or TAT polypeptide with an organic derivatizing agent that is capable of reacting with selected side chains or the N- or C- terminal residues of the anti-TAT antibody or TAT polypeptide. Derivatization with bifunctional agents is useful, for instance, for crosslinking anti-TAT antibody or TAT polypeptide to a water-insoluble support matrix or surface for use in the method for purifying anti-TAT antibodies, and vice-versa. Commonly used crosslinking agents include, e.g., 1,1-bis(diazoacetyl)-2-phenylethane, glutaraldehyde, N-hydroxysuccinimide esters, for example, esters with 4-azidosalicylic acid, homobifunctional imidoesters, including disuccinimidyl esters such as 3,3'-dithiobis(succinimidylpropionate), bifunctional maleimides such as bis-N-maleimido-1,8-octane and agents such as methyl-3-[(p-azidophenyl)dithio]propioimidate.

Other modifications include deamidation of glutaminyl and asparaginyl residues to the corresponding glutamyl and aspartyl residues, respectively, hydroxylation of proline and lysine, phosphorylation of hydroxyl groups of seryl or threonyl residues, methylation of the α-amino groups of lysine, arginine, and histidine side chains [T.E. Creighton, Proteins: Structure and Molecular Properties, W.H. Freeman & Co., San Francisco, pp. 79-86 (1983)], acetylation of the N-terminal amine, and amidation of any C-terminal carboxyl group.

Another type of covalent modification of the anti-TAT antibody or TAT polypeptide included within the scope of this invention comprises altering the native glycosylation pattern of the antibody or polypeptide. "Altering the native glycosylation pattern" is intended for purposes herein to mean deleting one or more carbohydrate moieties found in native sequence anti-TAT antibody or TAT polypeptide (either by removing the underlying glycosylation site or by deleting the glycosylation by chemical and/or enzymatic means), and/or adding one or more glycosylation sites that are not present in the native sequence anti-TAT antibody or TAT polypeptide. In addition, the phrase includes qualitative changes in the glycosylation of the native proteins, involving a change in the nature and proportions of the various carbohydrate moieties present.

Glycosylation of antibodies and other polypeptides is typically either N-linked or O-linked. N-linked refers to the attachment of the carbohydrate moiety to the side chain of an asparagine residue. The tripeptide sequences asparagine-X-serine and asparagine-X-threonine, where X is any amino acid except proline, are the recognition sequences for enzymatic attachment of the carbohydrate moiety to the asparagine side chain. Thus, the presence of either of these tripeptide sequences in a polypeptide creates a potential glycosylation site. O-linked glycosylation refers to the attachment of one of the sugars N-aceylgalactosamine, galactose, or xylose to a hydroxyamino acid, most commonly serine or threonine, although 5-hydroxyproline or 5-hydroxylysine may also be used.

Addition of glycosylation sites to the anti-TAT antibody or TAT polypeptide is conveniently accomplished by altering the amino acid sequence such that it contains one or more of the above-described tripeptide sequences (for N-linked glycosylation sites). The alteration may also be made by the addition of, or substitution by, one or more serine or threonine residues to the sequence of the original anti-TAT antibody or TAT polypeptide (for O-linked glycosylation sites). The anti-TAT antibody or TAT polypeptide amino acid

5   sequence may optionally be altered through changes at the DNA level, particularly by mutating the DNA encoding the anti-TAT antibody or TAT polypeptide at preselected bases such that codons are generated that will translate into the desired amino acids.

Another means of increasing the number of carbohydrate moieties on the anti-TAT antibody or TAT

10   polypeptide is by chemical or enzymatic coupling of glycosides to the polypeptide. Such methods are described in the art, e.g., in WO 87/05330 published 11 September 1987, and in Aplin and Wriston, CRC Crit. Rev. Biochem., pp. 259-306 (1981).

Removal of carbohydrate moieties present on the anti-TAT antibody or TAT polypeptide may be accomplished chemically or enzymatically or by mutational substitution of codons encoding for amino acid

15   residues that serve as targets for glycosylation. Chemical deglycosylation techniques are known in the art and described, for instance, by Hakimuddin, et al., Arch. Biochem. Biophys., 259:52 (1987) and by Edge et al., Anal. Biochem., 118:131 (1981). Enzymatic cleavage of carbohydrate moieties on polypeptides can be achieved by the use of a variety of endo- and exo-glycosidases as described by Thotakura et al., Meth. Enzymol., 138:350 (1987).

20   Another type of covalent modification of anti-TAT antibody or TAT polypeptide comprises linking the antibody or polypeptide to one of a variety of nonproteinaceous polymers, e.g., polyethylene glycol (PEG), polypropylene glycol, or polyoxyalkylenes, in the manner set forth in U.S. Patent Nos. 4,640,835; 4,496,689; 4,301,144; 4,670,417; 4,791,192 or 4,179,337. The antibody or polypeptide also may be entrapped in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization (for example,

25   hydroxymethylcellulose or gelatin-microcapsules and poly-(methylmethacylate) microcapsules, respectively), in colloidal drug delivery systems (for example, liposomes, albumin microspheres, microemulsions, nano-particles and nanocapsules), or in macroemulsions. Such techniques are disclosed in   Remington's Pharmaceutical Sciences, 16th edition, Oslo, A., Ed., (1980).

The anti-TAT antibody or TAT polypeptide of the present invention may also be modified in a way to

30   form chimeric molecules comprising an anti-TAT antibody or TAT polypeptide fused to another, heterologous polypeptide or amino acid sequence.

In one embodiment, such a chimeric molecule comprises a fusion of the anti-TAT antibody or TAT polypeptide with a tag polypeptide which provides an epitope to which an anti-tag antibody can selectively bind. The epitope tag is generally placed at the amino- or carboxyl- terminus of the anti-TAT antibody or TAT

35   polypeptide. The presence of such epitope-tagged forms of the anti-TAT antibody or TAT polypeptide can be detected using an antibody against the tag polypeptide. Also, provision of the epitope tag enables the anti-TAT

antibody or TAT polypeptide to be readily purified by affinity purification using an anti-tag antibody or another type of affinity matrix that binds to the epitope tag. Various tag polypeptides and their respective antibodies are well known in the art. Examples include poly-histidine (poly-his) or poly-histidine-glycine (poly-his-gly) tags; the flu HA tag polypeptide and its antibody 12CA5 [Field et al., Mol. Cell. Biol., 8:2159-2165 (1988)]; the c-myc tag and the 8F9, 3C7, 6E10, G4, B7 and 9E10 antibodies thereto [Evan et al., Molecular and Cellular Biology, 5:3610-3616 (1985)]; and the Herpes Simplex virus glycoprotein D (gD) tag and its antibody [Paborsky et al., Protein Engineering, 3(6):547-553 (1990)]. Other tag polypeptides include the Flag-peptide [Hopp et al., BioTechnology, 6:1204-1210 (1988)]; the KT3 epitope peptide [Martin et al., Science, 255:192-194 (1992)]; an α-tubulin epitope peptide [Skinner et al., J. Biol. Chem., 266:15163-15166 (1991)]; and the T7 gene 10 protein peptide tag [Lutz-Freyermuth et al., Proc. Natl. Acad. Sci. USA, 87:6393-6397 (1990)].

In an alternative embodiment, the chimeric molecule may comprise a fusion of the anti-TAT antibody or TAT polypeptide with an immunoglobulin or a particular region of an immunoglobulin. For a bivalent form of the chimeric molecule (also referred to as an "immunoadhesin"), such a fusion could be to the Fc region of an IgG molecule. The Ig fusions preferably include the substitution of a soluble (transmembrane domain deleted or inactivated) form of an anti-TAT antibody or TAT polypeptide in place of at least one variable region within an Ig molecule. In a particularly preferred embodiment, the immunoglobulin fusion includes the hinge, CH_2 and CH_3, or the hinge, CH_1, CH_2 and CH_3 regions of an IgG1 molecule. For the production of immunoglobulin fusions see also US Patent No. 5,428,130 issued June 27, 1995.

I.   Preparation of Anti-TAT Antibodies and TAT Polypeptides

The description below relates primarily to production of anti-TAT antibodies and TAT polypeptides by culturing cells transformed or transfected with a vector containing anti-TAT antibody- and TAT polypeptide-encoding nucleic acid. It is, of course, contemplated that alternative methods, which are well known in the art, may be employed to prepare anti-TAT antibodies and TAT polypeptides. For instance, the appropriate amino acid sequence, or portions thereof, may be produced by direct peptide synthesis using solid-phase techniques [see, e.g., Stewart et al., Solid-Phase Peptide Synthesis, W.H. Freeman Co., San Francisco, CA (1969); Merrifield, J. Am. Chem. Soc., 85:2149-2154 (1963)]. In vitro protein synthesis may be performed using manual techniques or by automation. Automated synthesis may be accomplished, for instance, using an Applied Biosystems Peptide Synthesizer (Foster City, CA) using manufacturer's instructions. Various portions of the anti-TAT antibody or TAT polypeptide may be chemically synthesized separately and combined using chemical or enzymatic methods to produce the desired anti-TAT antibody or TAT polypeptide.

1.   Isolation of DNA Encoding Anti-TAT Antibody or TAT Polypeptide

DNA encoding anti-TAT antibody or TAT polypeptide may be obtained from a cDNA library prepared from tissue believed to possess the anti-TAT antibody or TAT polypeptide mRNA and to express it at a detectable level. Accordingly, human anti-TAT antibody or TAT polypeptide DNA can be conveniently obtained from a cDNA library prepared from human tissue. The anti-TAT antibody- or TAT polypeptide-encoding gene may also be obtained from a genomic library or by known synthetic procedures (e.g., automated

nucleic acid synthesis).

Libraries can be screened with probes (such as oligonucleotides of at least about 20-80 bases) designed to identify the gene of interest or the protein encoded by it. Screening the cDNA or genomic library with the selected probe may be conducted using standard procedures, such as described in Sambrook et al., Molecular Cloning: A Laboratory Manual (New York: Cold Spring Harbor Laboratory Press, 1989). An alternative means
5   to isolate the gene encoding anti-TAT antibody or TAT polypeptide is to use PCR methodology [Sambrook et al., supra; Dieffenbach et al., PCR Primer: A Laboratory Manual (Cold Spring Harbor Laboratory Press, 1995)].

Techniques for screening a cDNA library are well known in the art. The oligonucleotide sequences selected as probes should be of sufficient length and sufficiently unambiguous that false positives are minimized.
10   The oligonucleotide is preferably labeled such that it can be detected upon hybridization to DNA in the library being screened. Methods of labeling are well known in the art, and include the use of radiolabels like ^{32}P-labeled ATP, biotinylation or enzyme labeling. Hybridization conditions, including moderate stringency and high stringency, are provided in Sambrook et al., supra.

Sequences identified in such library screening methods can be compared and aligned to other known
15   sequences deposited and available in public databases such as GenBank or other private sequence databases. Sequence identity (at either the amino acid or nucleotide level) within defined regions of the molecule or across the full-length sequence can be determined using methods known in the art and as described herein.

Nucleic acid having protein coding sequence may be obtained by screening selected cDNA or genomic libraries using the deduced amino acid sequence disclosed herein for the first time, and, if necessary, using
20   conventional primer extension procedures as described in Sambrook et al., supra, to detect precursors and processing intermediates of mRNA that may not have been reverse-transcribed into cDNA.

2.   Selection and Transformation of Host Cells

Host cells are transfected or transformed with expression or cloning vectors described herein for anti-TAT antibody or TAT polypeptide production and cultured in conventional nutrient media modified as
25   appropriate for inducing promoters, selecting transformants, or amplifying the genes encoding the desired sequences. The culture conditions, such as media, temperature, pH and the like, can be selected by the skilled artisan without undue experimentation. In general, principles, protocols, and practical techniques for maximizing the productivity of cell cultures can be found in Mammalian Cell Biotechnology: a Practical Approach, M. Butler, ed. (IRL Press, 1991) and Sambrook et al., supra.
30   Methods of eukaryotic cell transfection and prokaryotic cell transformation are known to the ordinarily skilled artisan, for example, CaCl$_2$, CaPO$_4$, liposome-mediated and electroporation. Depending on the host cell used, transformation is performed using standard techniques appropriate to such cells. The calcium treatment employing calcium chloride, as described in Sambrook et al., supra, or electroporation is generally used for prokaryotes. Infection with Agrobacterium tumefaciens is used for transformation of certain plant cells, as
35   described by Shaw et al., Gene, 23:315 (1983) and WO 89/05859 published 29 June 1989. For mammalian cells without such cell walls, the calcium phosphate precipitation method of Graham and van der Eb, Virology,

292

52:456-457 (1978) can be employed. General aspects of mammalian cell host system transfections have been described in U.S. Patent No. 4,399,216. Transformations into yeast are typically carried out according to the method of Van Solingen et al., J. Bact., 130:946 (1977) and Hsiao et al., Proc. Natl. Acad. Sci. (USA), 76:3829 (1979). However, other methods for introducing DNA into cells, such as by nuclear microinjection, electroporation, bacterial protoplast fusion with intact cells, or polycations, e.g., polybrene, polyornithine, may also be used. For various techniques for transforming mammalian cells, see Keown et al.,   Methods in Enzymology, 185:527-537 (1990) and Mansour et al., Nature, 336:348-352 (1988).

Suitable host cells for cloning or expressing the DNA in the vectors herein include prokaryote, yeast, or higher eukaryote cells. Suitable prokaryotes include but are not limited to eubacteria, such as Gram-negative or Gram-positive organisms, for example, Enterobacteriaceae such as E. coli. Various E. coli strains are publicly available, such as E. coli K12 strain MM294 (ATCC 31,446); E. coli X1776 (ATCC 31,537); E. coli strain W3110 (ATCC 27,325) and K5 772 (ATCC 53,635). Other suitable prokaryotic host cells include Enterobacteriaceae such as Escherichia, e.g., E. coli, Enterobacter, Erwinia, Klebsiella, Proteus, Salmonella, e.g., Salmonella typhimurium, Serratia, e.g., Serratia marcescans, and Shigella, as well as Bacilli such as B. subtilis and B. licheniformis (e.g., B. licheniformis 41P disclosed in DD 266,710 published 12 April 1989), Pseudomonas such as P. aeruginosa, and Streptomyces. These examples are illustrative rather than limiting. Strain W3110 is one particularly preferred host or parent host because it is a common host strain for recombinant DNA product fermentations. Preferably, the host cell secretes minimal amounts of proteolytic enzymes. For example, strain W3110 may be modified to effect a genetic mutation in the genes encoding proteins endogenous to the host, with examples of such hosts including E. coli W3110 strain 1A2, which has the complete genotype tonA ; E. coli W3110 strain 9E4, which has the complete genotype tonA ptr3; E. coli W3110 strain 27C7 (ATCC 55,244), which has the complete genotype tonA ptr3 phoA E15 (argF-lac)169 degP ompT kan^r; E. coli W3110 strain 37D6, which has the complete genotype tonA ptr3 phoA E15 (argF-lac)169 degP ompT rbs7 ilvG kan^r; E. coli W3110 strain 40B4, which is strain 37D6 with a non-kanamycin resistant degP deletion mutation; and an E. coli strain having mutant periplasmic protease disclosed in U.S. Patent No. 4,946,783 issued 7 August 1990. Alternatively, in vitro methods of cloning, e.g., PCR or other nucleic acid polymerase reactions, are suitable.

Full length antibody, antibody fragments, and antibody fusion proteins can be produced in bacteria, in particular when glycosylation and Fc effector function are not needed, such as when the therapeutic antibody is conjugated to a cytotoxic agent (e.g., a toxin) and the immunoconjugate by itself shows effectiveness in tumor cell destruction. Full length antibodies have greater half life in circulation. Production in E. coli is faster and more cost efficient. For expression of antibody fragments and polypeptides in bacteria, see, e.g., U.S. 5,648,237 (Carter et. al.), U.S. 5,789,199 (Joly et al.), and U.S. 5,840,523 (Simmons et al.) which describes translation initiation regio (TIR) and signal sequences for optimizing expression and secretion, these patents incorporated herein by reference. After expression, the antibody is isolated from the E. coli cell paste in a soluble fraction and can be purified through, e.g., a protein A or G column depending on the isotype. Final purification can be carried out similar to the process for purifying antibody expressed e.g., in CHO cells.

293

In addition to prokaryotes, eukaryotic microbes such as filamentous fungi or yeast are suitable cloning or expression hosts for anti-TAT antibody- or TAT polypeptide-encoding vectors. *Saccharomyces cerevisiae* is a commonly used lower eukaryotic host microorganism. Others include *Schizosaccharomyces pombe* (Beach and Nurse, Nature, 290: 140 [1981]; EP 139,383 published 2 May 1985); *Kluyveromyces* hosts (U.S. Patent No. 4,943,529; Fleer et al., Bio/Technology, 9:968-975 (1991)) such as, e.g., *K. lactis* (MW98-8C, CBS683, CBS4574; Louvencourt et al., J. Bacteriol., 154(2):737-742 [1983]), *K. fragilis* (ATCC 12,424), *K. bulgaricus* (ATCC 16,045), *K. wickeramii* (ATCC 24,178), *K. waltii* (ATCC 56,500), *K. drosophilarum* (ATCC 36,906; Van den Berg et al., Bio/Technology, 8:135 (1990)), *K. thermotolerans*, and *K. marxianus; yarrowia* (EP 402,226); *Pichia pastoris* (EP 183,070; Sreekrishna et al., J. Basic Microbiol., 28:265-278 [1988]); *Candida; Trichoderma reesia* (EP 244,234); *Neurospora crassa* (Case et al., Proc. Natl. Acad. Sci. USA, 76:5259-5263 [1979]); *Schwanniomyces* such as *Schwanniomyces occidentalis* (EP 394,538 published 31 October 1990); and filamentous fungi such as, e.g., *Neurospora, Penicillium, Tolypocladium* (WO 91/00357 published 10 January 1991), and *Aspergillus* hosts such as *A. nidulans* (Ballance et al., Biochem. Biophys. Res. Commun., 112:284-289 [1983]; Tilburn et al., Gene, 26:205-221 [1983]; Yelton et al., Proc. Natl. Acad. Sci. USA, 81: 1470-1474 [1984]) and *A. niger* (Kelly and Hynes, EMBO J., 4:475-479 [1985]). Methylotropic yeasts are suitable herein and include, but are not limited to, yeast capable of growth on methanol selected from the genera consisting of *Hansenula, Candida, Kloeckera, Pichia, Saccharomyces, Torulopsis,* and *Rhodotorula*. A list of specific species that are exemplary of this class of yeasts may be found in C. Anthony, The Biochemistry of Methylotrophs, 269 (1982).

Suitable host cells for the expression of glycosylated anti-TAT antibody or TAT polypeptide are derived from multicellular organisms. Examples of invertebrate cells include insect cells such as Drosophila S2 and Spodoptera Sf9, as well as plant cells, such as cell cultures of cotton, corn, potato, soybean, petunia, tomato, and tobacco. Numerous baculoviral strains and variants and corresponding permissive insect host cells from hosts such as *Spodoptera frugiperda* (caterpillar), *Aedes aegypti* (mosquito), *Aedes albopictus* (mosquito), *Drosophila melanogaster* (fruitfly), and *Bombyx mori* have been identified. A variety of viral strains for transfection are publicly available, e.g., the L-1 variant of *Autographa californica* NPV and the Bm-5 strain of *Bombyx mori* NPV, and such viruses may be used as the virus herein according to the present invention, particularly for transfection of *Spodoptera frugiperda* cells.

However, interest has been greatest in vertebrate cells, and propagation of vertebrate cells in culture (tissue culture) has become a routine procedure. Examples of useful mammalian host cell lines are monkey kidney CV1 line transformed by SV40 (COS-7, ATCC CRL 1651); human embryonic kidney line (293 or 293 cells subcloned for growth in suspension culture, Graham et al., J. Gen Virol. 36:59 (1977)); baby hamster kidney cells (BHK, ATCC CCL 10); Chinese hamster ovary cells/-DHFR (CHO, Urlaub et al., Proc. Natl. Acad. Sci. USA 77:4216 (1980)); mouse sertoli cells (TM4, Mather, Biol. Reprod. 23:243-251 (1980)); monkey kidney cells (CV1 ATCC CCL 70); African green monkey kidney cells (VERO-76, ATCC CRL-1587); human cervical carcinoma cells (HELA, ATCC CCL 2); canine kidney cells (MDCK, ATCC CCL 34); buffalo rat liver cells (BRL 3A, ATCC CRL 1442); human lung cells (W138, ATCC CCL 75); human liver cells (Hep G2,

294

HB 8065); mouse mammary tumor (MMT 060562, ATCC CCL51); TRI cells (Mather et al., Annals N.Y. Acad. Sci. 383:44-68 (1982)); MRC 5 cells; FS4 cells; and a human hepatoma line (Hep G2).

Host cells are transformed with the above-described expression or cloning vectors for anti-TAT antibody or TAT polypeptide production and cultured in conventional nutrient media modified as appropriate for inducing promoters, selecting transformants, or amplifying the genes encoding the desired sequences.

5   3.   Selection and Use of a Replicable Vector

The nucleic acid (e.g., cDNA or genomic DNA) encoding anti-TAT antibody or TAT polypeptide may be inserted into a replicable vector for cloning (amplification of the DNA) or for expression. Various vectors are publicly available. The vector may, for example, be in the form of a plasmid, cosmid, viral particle, or phage. The appropriate nucleic acid sequence may be inserted into the vector by a variety of procedures. In

10   general, DNA is inserted into an appropriate restriction endonuclease site(s) using techniques known in the art. Vector components generally include, but are not limited to, one or more of a signal sequence, an origin of replication, one or more marker genes, an enhancer element, a promoter, and a transcription termination sequence. Construction of suitable vectors containing one or more of these components employs standard ligation techniques which are known to the skilled artisan.

15   The TAT may be produced recombinantly not only directly, but also as a fusion polypeptide with a heterologous polypeptide, which may be a signal sequence or other polypeptide having a specific cleavage site at the N-terminus of the mature protein or polypeptide. In general, the signal sequence may be a component of the vector, or it may be a part of the anti-TAT antibody- or TAT polypeptide-encoding DNA that is inserted into the vector. The signal sequence may be a prokaryotic signal sequence selected, for example, from the

20   group of the alkaline phosphatase, penicillinase, lpp, or heat-stable enterotoxin II leaders. For yeast secretion the signal sequence may be, e.g., the yeast invertase leader, alpha factor leader (including Saccharomyces and Kluyveromyces α-factor leaders, the latter described in U.S. Patent No. 5,010,182), or acid phosphatase leader, the C. albicans glucoamylase leader (EP 362,179 published 4 April 1990), or the signal described in WO 90/13646 published 15 November 1990. In mammalian cell expression, mammalian signal sequences may be

25   used to direct secretion of the protein, such as signal sequences from secreted polypeptides of the same or related species, as well as viral secretory leaders.

Both expression and cloning vectors contain a nucleic acid sequence that enables the vector to replicate in one or more selected host cells. Such sequences are well known for a variety of bacteria, yeast, and viruses. The origin of replication from the plasmid pBR322 is suitable for most Gram-negative bacteria, the 2μ plasmid

30   origin is suitable for yeast, and various viral origins (SV40, polyoma, adenovirus, VSV or BPV) are useful for cloning vectors in mammalian cells.

Expression and cloning vectors will typically contain a selection gene, also termed a selectable marker. Typical selection genes encode proteins that (a) confer resistance to antibiotics or other toxins, e.g., ampicillin, neomycin, methotrexate, or tetracycline, (b) complement auxotrophic deficiencies, or (c) supply critical

35   nutrients not available from complex media, e.g., the gene encoding D-alanine racemase for Bacilli.

An example of suitable selectable markers for mammalian cells are those that enable the identification

of cells competent to take up the anti-TAT antibody- or TAT polypeptide-encoding nucleic acid, such as DHFR or thymidine kinase. An appropriate host cell when wild-type DHFR is employed is the CHO cell line deficient in DHFR activity, prepared and propagated as described by Urlaub et al., Proc. Natl. Acad. Sci. USA, 77:4216 (1980). A suitable selection gene for use in yeast is the   trp1 gene present in the yeast plasmid YRp7 [Stinchcomb et al., Nature, 282:39 (1979); Kingsman et al., Gene, 7:141 (1979); Tschemper et al., Gene, 10:157 (1980)]. The trp1 gene provides a selection marker for a mutant strain of yeast lacking the ability to grow in tryptophan, for example, ATCC No. 44076 or PEP4-1 [Jones, Genetics, 85:12 (1977)].

Expression and cloning vectors usually contain a promoter operably linked to the anti-TAT antibody- or TAT polypeptide-encoding nucleic acid sequence to direct mRNA synthesis. Promoters recognized by a variety of potential host cells are well known. Promoters suitable for use with prokaryotic hosts include theβ-lactamase and lactose promoter systems [Chang et al., Nature, 275:615 (1978); Goeddel et al., Nature, 281:544 (1979)], alkaline phosphatase, a tryptophan (trp) promoter system [Goeddel,Nucleic Acids Res., 8:4057 (1980); EP 36,776], and hybrid promoters such as the tac promoter [deBoer et al., Proc. Natl. Acad. Sci. USA, 80:21-25 (1983)]. Promoters for use in bacterial systems also will contain a Shine-Dalgarno (S.D.) sequence operably linked to the DNA encoding anti-TAT antibody or TAT polypeptide.

Examples of suitable promoting sequences for use with yeast hosts include the promoters for 3-phosphoglycerate kinase [Hitzeman et al., J. Biol. Chem., 255:2073 (1980)] or other glycolytic enzymes [Hess et al., J. Adv. Enzyme Reg., 7:149 (1968); Holland, Biochemistry, 17:4900 (1978)], such as enolase, glyceraldehyde-3-phosphate dehydrogenase, hexokinase, pyruvate decarboxylase, phosphofructokinase, glucose-6-phosphate isomerase, 3-phosphoglycerate mutase, pyruvate kinase, triosephosphate isomerase, phosphoglucose isomerase, and glucokinase.

Other yeast promoters, which are inducible promoters having the additional advantage of transcription controlled by growth conditions, are the promoter regions for alcohol dehydrogenase 2, isocytochrome C, acid phosphatase, degradative enzymes associated with nitrogen metabolism, metallothionein, glyceraldehyde-3-phosphate dehydrogenase, and enzymes responsible for maltose and galactose utilization. Suitable vectors and promoters for use in yeast expression are further described in EP 73,657.

Anti-TAT antibody or TAT polypeptide transcription from vectors in mammalian host cells is controlled, for example, by promoters obtained from the genomes of viruses such as polyoma virus, fowlpox virus (UK 2,211,504 published 5 July 1989), adenovirus (such as Adenovirus 2), bovine papilloma virus, avian sarcoma virus, cytomegalovirus, a retrovirus, hepatitis-B virus and Simian Virus 40 (SV40), from heterologous mammalian promoters, e.g., the actin promoter or an immunoglobulin promoter, and from heat-shock promoters, provided such promoters are compatible with the host cell systems.

Transcription of a DNA encoding the anti-TAT antibody or TAT polypeptide by higher eukaryotes may be increased by inserting an enhancer sequence into the vector. Enhancers are cis-acting elements of DNA, usually about from 10 to 300 bp, that act on a promoter to increase its transcription. Many enhancer sequences are now known from mammalian genes (globin, elastase, albumin, α-fetoprotein, and insulin). Typically, however, one will use an enhancer from a eukaryotic cell virus. Examples include the SV40 enhancer on the

late side of the replication origin (bp 100-270), the cytomegalovirus early promoter enhancer, the polyoma enhancer on the late side of the replication origin, and adenovirus enhancers. The enhancer may be spliced into the vector at a position 5' or 3' to the anti-TAT antibody or TAT polypeptide coding sequence, but is preferably located at a site 5' from the promoter.

5   Expression vectors used in eukaryotic host cells (yeast, fungi, insect, plant, animal, human, or nucleated cells from other multicellular organisms) will also contain sequences necessary for the termination of transcription and for stabilizing the mRNA. Such sequences are commonly available from the 5' and, occasionally 3', untranslated regions of eukaryotic or viral DNAs or cDNAs. These regions contain nucleotide segments transcribed as polyadenylated fragments in the untranslated portion of the mRNA encoding anti-TAT antibody or TAT polypeptide.

10   Still other methods, vectors, and host cells suitable for adaptation to the synthesis of anti-TAT antibody or TAT polypeptide in recombinant vertebrate cell culture are described in Gething et al., Nature, 293:620-625 (1981); Mantei et al., Nature, 281:40-46 (1979); EP 117,060; and EP 117,058.

4.   Culturing the Host Cells

The host cells used to produce the anti-TAT antibody or TAT polypeptide of this invention may be

15   cultured in a variety of media. Commercially available media such as Ham's F10 (Sigma), Minimal Essential Medium ((MEM), (Sigma), RPMI-1640 (Sigma), and Dulbecco's Modified Eagle's Medium ((DMEM), Sigma) are suitable for culturing the host cells. In addition, any of the media described in Ham et al Meth. Enz. 58:44 (1979), Barnes et al., Anal. Biochem. 102:255 (1980), U.S. Pat. Nos. 4,767,704; 4,657,866; 4,927,762; 4,560,655; or 5,122,469; WO 90/03430; WO 87/00195; or U.S. Patent Re. 30,985 may be used as culture

20   media for the host cells. Any of these media may be supplemented as necessary with hormones and/or other growth factors (such as insulin, transferrin, or epidermal growth factor), salts (such as sodium chloride, calcium, magnesium, and phosphate), buffers (such as HEPES), nucleotides (such as adenosine and thymidine), antibiotics (such as GENTAMYCIN™ drug), trace elements (defined as inorganic compounds usually present at final concentrations in the micromolar range), and glucose or an equivalent energy source. Any other

25   necessary supplements may also be included at appropriate concentrations that would be known to those skilled in the art. The culture conditions, such as temperature, pH, and the like, are those previously used with the host cell selected for expression, and will be apparent to the ordinarily skilled artisan.

5.   Detecting Gene Amplification/Expression

Gene amplification and/or expression may be measured in a sample directly, for example, by conventional Southern blotting, Northern blotting to quantitate the transcription of mRNA [Thomas, Proc. Natl. Acad. Sci. USA , 77:5201-5205 (1980)], dot blotting (DNA analysis), or *in situ* hybridization, using an appropriately labeled probe, based on the sequences provided herein. Alternatively, antibodies may be employed that can recognize specific duplexes, including DNA duplexes, RNA duplexes, and DNA-RNA hybrid duplexes or DNA-protein duplexes. The antibodies in turn may be labeled and the assay may be carried out where the duplex is bound to a surface, so that upon the formation of duplex on the surface, the presence of antibody bound to the duplex can be detected.

Gene expression, alternatively, may be measured by immunological methods, such as immunohistochemical staining of cells or tissue sections and assay of cell culture or body fluids, to quantitate directly the expression of gene product. Antibodies useful for immunohistochemical staining and/or assay of sample fluids may be either monoclonal or polyclonal, and may be prepared in any mammal. Conveniently, the antibodies may be prepared against a native sequence TAT polypeptide or against a synthetic peptide based on the DNA sequences provided herein or against exogenous sequence fused to TAT DNA and encoding a specific antibody epitope.

6.   Purification of Anti-TAT Antibody and TAT Polypeptide

Forms of anti-TAT antibody and TAT polypeptide may be recovered from culture medium or from host cell lysates. If membrane-bound, it can be released from the membrane using a suitable detergent solution (e.g. Triton-X 100) or by enzymatic cleavage. Cells employed in expression of anti-TAT antibody and TAT polypeptide can be disrupted by various physical or chemical means, such as freeze-thaw cycling, sonication, mechanical disruption, or cell lysing agents.

It may be desired to purify anti-TAT antibody and TAT polypeptide from recombinant cell proteins or polypeptides. The following procedures are exemplary of suitable purification procedures: by fractionation on an ion-exchange column; ethanol precipitation; reverse phase HPLC; chromatography on silica or on a cation-exchange resin such as DEAE; chromatofocusing; SDS-PAGE; ammonium sulfate precipitation; gel filtration using, for example, Sephadex G-75; protein A Sepharose columns to remove contaminants such as IgG; and metal chelating columns to bind epitope-tagged forms of the anti-TAT antibody and TAT polypeptide. Various methods of protein purification may be employed and such methods are known in the art and described for example in Deutscher, Methods in Enzymology, 182 (1990); Scopes, Protein Purification: Principles and Practice, Springer-Verlag, New York (1982). The purification step(s) selected will depend, for example, on the nature of the production process used and the particular anti-TAT antibody or TAT polypeptide produced.

When using recombinant techniques, the antibody can be produced intracellularly, in the periplasmic space, or directly secreted into the medium. If the antibody is produced intracellularly, as a first step, the particulate debris, either host cells or lysed fragments, are removed, for example, by centrifugation or ultrafiltration. Carter et al., Bio/Technology 10:163-167 (1992) describe a procedure for isolating antibodies which are secreted to the periplasmic space of *E. coli*. Briefly, cell paste is thawed in the presence of sodium

298

acetate (pH 3.5), EDTA, and phenylmethylsulfonylfluoride (PMSF) over about 30 min. Cell debris can be removed by centrifugation. Where the antibody is secreted into the medium, supernatants from such expression systems are generally first concentrated using a commercially available protein concentration filter, for example, an Amicon or Millipore Pellicon ultrafiltration unit. A protease inhibitor such as PMSF may be included in any of the foregoing steps to inhibit proteolysis and antibiotics may be included to prevent the growth of adventitious

5   contaminants.

The antibody composition prepared from the cells can be purified using, for example, hydroxylapatite chromatography, gel electrophoresis, dialysis, and affinity chromatography, with affinity chromatography being the preferred purification technique. The suitability of protein A as an affinity ligand depends on the species and isotype of any immunoglobulin Fc domain that is present in the antibody. Protein A can be used to purify

10   antibodies that are based on human γ1, γ2 or γ4 heavy chains (Lindmark et al., J. Immunol. Meth. 62:1-13 (1983)). Protein G is recommended for all mouse isotypes and for human   γ3 (Guss et al., EMBO J. 5:15671575 (1986)). The matrix to which the affinity ligand is attached is most often agarose, but other matrices are available. Mechanically stable matrices such as controlled pore glass or poly(styrenedivinyl)benzene allow for faster flow rates and shorter processing times than can be achieved with

15   agarose. Where the antibody comprises a C_H3 domain, the Bakerbond ABX™resin (J. T. Baker, Phillipsburg, NJ) is useful for purification. Other techniques for protein purification such as fractionation on an ion-exchange column, ethanol precipitation, Reverse Phase HPLC, chromatography on silica, chromatography on heparin SEPHAROSE™ chromatography on an anion or cation exchange resin (such as a polyaspartic acid column), chromatofocusing, SDS-PAGE, and ammonium sulfate precipitation are also available depending on the antibody

20   to be recovered.

Following any preliminary purification step(s), the mixture comprising the antibody of interest and contaminants may be subjected to low pH hydrophobic interaction chromatography using an elution buffer at a pH between about 2.5-4.5, preferably performed at low salt concentrations (e.g., from about 0-0.25M salt).

J.   Pharmaceutical Formulations

25   Therapeutic formulations of the anti-TAT antibodies, TAT binding oligopeptides, TAT binding organic molecules and/or TAT polypeptides used in accordance with the present invention are prepared for storage by mixing the antibody, polypeptide, oligopeptide or organic molecule having the desired degree of purity with optional pharmaceutically acceptable carriers, excipients or stabilizers (Remington's Pharmaceutical Sciences 16th edition, Osol, A. Ed. (1980)), in the form of lyophilized formulations or aqueous solutions. Acceptable

30   carriers, excipients, or stabilizers are nontoxic to recipients at the dosages and concentrations employed, and include buffers such as acetate, Tris, phosphate, citrate, and other organic acids; antioxidants including ascorbic acid and methionine; preservatives (such as octadecyldimethylbenzyl ammonium chloride; hexamethonium chloride; benzalkonium chloride, benzethonium chloride; phenol, butyl or benzyl alcohol; alkyl parabens such as methyl or propyl paraben; catechol; resorcinol; cyclohexanol; 3-pentanol; and m-cresol); low molecular

35   weight (less than about 10 residues) polypeptides; proteins, such as serum albumin, gelatin, or immunoglobulins; hydrophilic polymers such as polyvinylpyrrolidone; amino acids such as glycine, glutamine, asparagine,

histidine, arginine, or lysine; monosaccharides, disaccharides, and other carbohydrates including glucose, mannose, or dextrins; chelating agents such as EDTA; tonicifiers such as trehalose and sodium chloride; sugars such as sucrose, mannitol, trehalose or sorbitol; surfactant such as polysorbate; salt-forming counter-ions such as sodium; metal complexes (e.g., Zn-protein complexes); and/or non-ionic surfactants such as TWEEN®, PLURONICS® or polyethylene glycol (PEG). The antibody preferably comprises the antibody at a concentration of between 5-200 mg/ml, preferably between 10-100 mg/ml.

The formulations herein may also contain more than one active compound as necessary for the particular indication being treated, preferably those with complementary activities that do not adversely affect each other. For example, in addition to an anti-TAT antibody, TAT binding oligopeptide, or TAT binding organic molecule, it may be desirable to include in the one formulation, an additional antibody, e.g., a second anti-TAT antibody which binds a different epitope on the TAT polypeptide, or an antibody to some other target such as a growth factor that affects the growth of the particular cancer. Alternatively, or additionally, the composition may further comprise a chemotherapeutic agent, cytotoxic agent, cytokine, growth inhibitory agent, anti-hormonal agent, and/or cardioprotectant. Such molecules are suitably present in combination in amounts that are effective for the purpose intended.

The active ingredients may also be entrapped in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization, for example, hydroxymethylcellulose or gelatin-microcapsules and poly-(methylmethacylate) microcapsules, respectively, in colloidal drug delivery systems (for example, liposomes, albumin microspheres, microemulsions, nano-particles and nanocapsules) or in macroemulsions. Such techniques are disclosed in Remington's Pharmaceutical Sciences, 16th edition, Osol, A. Ed. (1980).

Sustained-release preparations may be prepared. Suitable examples of sustained-release preparations include semi-permeable matrices of solid hydrophobic polymers containing the antibody, which matrices are in the form of shaped articles, e.g., films, or microcapsules. Examples of sustained-release matrices include polyesters, hydrogels (for example, poly(2-hydroxyethyl-methacrylate), or poly(vinylalcohol)), polylactides (U.S. Pat. No. 3,773,919), copolymers of L-glutamic acid and γ ethyl-L-glutamate, non-degradable ethylene-vinyl acetate, degradable lactic acid-glycolic acid copolymers such as the LUPRON DEPOT® (injectable microspheres composed of lactic acid-glycolic acid copolymer and leuprolide acetate), and poly-D-(-)-3-hydroxybutyric acid.

The formulations to be used for *in vivo* administration must be sterile. This is readily accomplished by filtration through sterile filtration membranes.

K.   Diagnosis and Treatment with Anti-TAT Antibodies, TAT Binding Oligopeptides and TAT Binding Organic Molecules

To determine TAT expression in the cancer, various diagnostic assays are available. In one embodiment, TAT polypeptide overexpression may be analyzed by immunohistochemistry (IHC). Parrafin embedded tissue sections from a tumor biopsy may be subjected to the IHC assay and accorded a TAT protein staining intensity criteria as follows:

300

Score 0 - no staining is observed or membrane staining is observed in less than 10% of tumor cells.

Score 1+ - a faint/barely perceptible membrane staining is detected in more than 10% of the tumor cells. The cells are only stained in part of their membrane.

Score 2+ - a weak to moderate complete membrane staining is observed in more than 10% of the tumor cells.

5   Score 3+ - a moderate to strong complete membrane staining is observed in more than 10% of the tumor cells.

Those tumors with 0 or 1+ scores for TAT polypeptide expression may be characterized as not overexpressing TAT, whereas those tumors with 2+ or 3+ scores may be characterized as overexpressing TAT.

10   Alternatively, or additionally, FISH assays such as the INFORM® (sold by Ventana, Arizona) or PATHVISION® (Vysis, Illinois) may be carried out on formalin-fixed, paraffin-embedded tumor tissue to determine the extent (if any) of TAT overexpression in the tumor.

TAT overexpression or amplification may be evaluated using an *in vivo* diagnostic assay, e.g., by administering a molecule (such as an antibody, oligopeptide or organic molecule) which binds the molecule to
15   be detected and is tagged with a detectable label (e.g., a radioactive isotope or a fluorescent label) and externally scanning the patient for localization of the label.

As described above, the anti-TAT antibodies, oligopeptides and organic molecules of the invention have various non-therapeutic applications. The anti-TAT antibodies, oligopeptides and organic molecules of the present invention can be useful for diagnosis and staging of TAT polypeptide-expressing cancers (e.g., in
20   radioimaging). The antibodies, oligopeptides and organic molecules are also useful for purification or immunoprecipitation of TAT polypeptide from cells, for detection and quantitation of TAT polypeptide *in vitro*, e.g., in an ELISA or a Western blot, to kill and eliminate TAT-expressing cells from a population of mixed cells as a step in the purification of other cells.

Currently, depending on the stage of the cancer, cancer treatment involves one or a combination of the
25   following therapies: surgery to remove the cancerous tissue, radiation therapy, and chemotherapy. Anti-TAT antibody, oligopeptide or organic molecule therapy may be especially desirable in elderly patients who do not tolerate the toxicity and side effects of chemotherapy well and in metastatic disease where radiation therapy has limited usefulness. The tumor targeting anti-TAT antibodies, oligopeptides and organic molecules of the invention are useful to alleviate TAT-expressing cancers upon initial diagnosis of the disease or during relapse.
30   For therapeutic applications, the anti-TAT antibody, oligopeptide or organic molecule can be used alone, or in combination therapy with, e.g., hormones, antiangiogens, or radiolabelled compounds, or with surgery, cryotherapy, and/or radiotherapy. Anti-TAT antibody, oligopeptide or organic molecule treatment can be administered in conjunction with other forms of conventional therapy, either consecutively with, pre- or post-conventional therapy. Chemotherapeutic drugs such as TAXOTERE® (docetaxel), TAXOL® (palictaxel),
35   estramustine and mitoxantrone are used in treating cancer, in particular, in good risk patients. In the present method of the invention for treating or alleviating cancer, the cancer patient can be administered anti-TAT

301

antibody, oligopeptide or organic molecule in conjuction with treatment with the one or more of the preceding chemotherapeutic agents. In particular, combination therapy with palictaxel and modified derivatives (see, e.g., EP0600517) is contemplated. The anti-TAT antibody, oligopeptide or organic molecule will be administered with a therapeutically effective dose of the chemotherapeutic agent. In another embodiment, the anti-TAT antibody, oligopeptide or organic molecule is administered in conjunction with chemotherapy to enhance the

5   activity and efficacy of the chemotherapeutic agent, e.g., paclitaxel. The Physicians' Desk Reference (PDR) discloses dosages of these agents that have been used in treatment of various cancers. The dosing regimen and dosages of these aforementioned chemotherapeutic drugs that are therapeutically effective will depend on the particular cancer being treated, the extent of the disease and other factors familiar to the physician of skill in the art and can be determined by the physician.

10   In one particular embodiment, a conjugate comprising an anti-TAT antibody, oligopeptide or organic molecule conjugated with a cytotoxic agent is administered to the patient. Preferably, the immunoconjugate bound to the TAT protein is internalized by the cell, resulting in increased therapeutic efficacy of the immunoconjugate in killing the cancer cell to which it binds. In a preferred embodiment, the cytotoxic agent targets or interferes with the nucleic acid in the cancer cell. Examples of such cytotoxic agents are described

15   above and include maytansinoids, calicheamicins, ribonucleases and DNA endonucleases.

The anti-TAT antibodies, oligopeptides, organic molecules or toxin conjugates thereof are administered to a human patient, in accord with known methods, such as intravenous administration, e.g.,, as a bolus or by continuous infusion over a period of time, by intramuscular, intraperitoneal, intracerobrospinal, subcutaneous, intra-articular, intrasynovial, intrathecal, oral, topical, or inhalation routes. Intravenous or subcutaneous

20   administration of the antibody, oligopeptide or organic molecule is preferred.

Other therapeutic regimens may be combined with the administration of the anti-TAT antibody, oligopeptide or organic molecule. The combined administration includes co-administration, using separate formulations or a single pharmaceutical formulation, and consecutive administration in either order, wherein preferably there is a time period while both (or all) active agents simultaneously exert their biological activities.

25   Preferably such combined therapy results in a synergistic therapeutic effect.

It may also be desirable to combine administration of the anti-TAT antibody or antibodies, oligopeptides or organic molecules, with administration of an antibody directed against another tumor antigen associated with the particular cancer.

In another embodiment, the therapeutic treatment methods of the present invention involves the

30   combined administration of an anti-TAT antibody (or antibodies), oligopeptides or organic molecules and one or more chemotherapeutic agents or growth inhibitory agents, including co-administration of cocktails of different chemotherapeutic agents. Chemotherapeutic agents include estramustine phosphate, prednimustine, cisplatin, 5-fluorouracil, melphalan, cyclophosphamide, hydroxyurea and hydroxyureataxanes (such as paclitaxel and doxetaxel) and/or anthracycline antibiotics. Preparation and dosing schedules for such chemotherapeutic

35   agents may be used according to manufacturers' instructions or as determined empirically by the skilled practitioner. Preparation and dosing schedules for such chemotherapy are also described in Chemotherapy

302

Service Ed., M.C. Perry, Williams & Wilkins, Baltimore, MD (1992).

The antibody, oligopeptide or organic molecule may be combined with an anti-hormonal compound; e.g., an anti-estrogen compound such as tamoxifen; an anti-progesterone such as onapristone (see, EP 616 812); or an anti-androgen such as flutamide, in dosages known for such molecules. Where the cancer to be treated is androgen independent cancer, the patient may previously have been subjected to anti-androgen therapy and,

5   after the cancer becomes androgen independent, the anti-TAT antibody, oligopeptide or organic molecule (and optionally other agents as described herein) may be administered to the patient.

Sometimes, it may be beneficial to also co-administer a cardioprotectant (to prevent or reduce myocardial dysfunction associated with the therapy) or one or more cytokines to the patient. In addition to the above therapeutic regimes, the patient may be subjected to surgical removal of cancer cells and/or radiation

10   therapy, before, simultaneously with, or post antibody, oligopeptide or organic molecule therapy. Suitable dosages for any of the above co-administered agents are those presently used and may be lowered due to the combined action (synergy) of the agent and anti-TAT antibody, oligopeptide or organic molecule.

For the prevention or treatment of disease, the dosage and mode of administration will be chosen by the physician according to known criteria. The appropriate dosage of antibody, oligopeptide or organic molecule

15   will depend on the type of disease to be treated, as defined above, the severity and course of the disease, whether the antibody, oligopeptide or organic molecule is administered for preventive or therapeutic purposes, previous therapy, the patient's clinical history and response to the antibody, oligopeptide or organic molecule, and the discretion of the attending physician. The antibody, oligopeptide or organic molecule is suitably administered to the patient at one time or over a series of treatments. Preferably, the antibody, oligopeptide

20   or organic molecule is administered by intravenous infusion or by subcutaneous injections. Depending on the type and severity of the disease, about 1 µg/kg to about 50 mg/kg body weight (e.g., about 0.1-15mg/kg/dose) of antibody can be an initial candidate dosage for administration to the patient, whether, for example, by one or more separate administrations, or by continuous infusion. A dosing regimen can comprise administering an initial loading dose of about 4 mg/kg, followed by a weekly maintenance dose of about 2 mg/kg of the anti-TAT

25   antibody. However, other dosage regimens may be useful. A typical daily dosage might range from about 1 µg/kg to 100 mg/kg or more, depending on the factors mentioned above. For repeated administrations over several days or longer, depending on the condition, the treatment is sustained until a desired suppression of disease symptoms occurs. The progress of this therapy can be readily monitored by conventional methods and assays and based on criteria known to the physician or other persons of skill in the art.

30   Aside from administration of the antibody protein to the patient, the present application contemplates administration of the antibody by gene therapy. Such administration of nucleic acid encoding the antibody is encompassed by the expression "administering a therapeutically effective amount of an antibody". See, for example, WO96/07321 published March 14, 1996 concerning the use of gene therapy to generate intracellular antibodies.

35   There are two major approaches to getting the nucleic acid (optionally contained in a vector) into the patient's cells; *in vivo* and *ex vivo*. For *in vivo* delivery the nucleic acid is injected directly into the patient,

303

usually at the site where the antibody is required. For *ex vivo* treatment, the patient's cells are removed, the nucleic acid is introduced into these isolated cells and the modified cells are administered to the patient either directly or, for example, encapsulated within porous membranes which are implanted into the patient (see, e.g., U.S. Patent Nos. 4,892,538 and 5,283,187). There are a variety of techniques available for introducing nucleic acids into viable cells. The techniques vary depending upon whether the nucleic acid is transferred into cultured

5   cells *in vitro*, or *in vivo* in the cells of the intended host. Techniques suitable for the transfer of nucleic acid into mammalian cells *in vitro* include the use of liposomes, electroporation, microinjection, cell fusion, DEAE-dextran, the calcium phosphate precipitation method, etc. A commonly used vector for *ex vivo* delivery of the gene is a retroviral vector.

The currently preferred *in vivo* nucleic acid transfer techniques include transfection with viral vectors

10   (such as adenovirus, Herpes simplex I virus, or adeno-associated virus) and lipid-based systems (useful lipids for lipid-mediated transfer of the gene are DOTMA, DOPE and DC-Chol, for example). For review of the currently known gene marking and gene therapy protocols see Anderson et al., Science 256:808-813 (1992). See also WO 93/25673 and the references cited therein.

The anti-TAT antibodies of the invention can be in the different forms encompassed by the definition

15   of "antibody" herein. Thus, the antibodies include full length or intact antibody, antibody fragments, native sequence antibody or amino acid variants, humanized, chimeric or fusion antibodies, immunoconjugates, and functional fragments thereof. In fusion antibodies an antibody sequence is fused to a heterologous polypeptide sequence. The antibodies can be modified in the Fc region to provide desired effector functions. As discussed in more detail in the sections herein, with the appropriate Fc regions, the naked antibody bound on the cell

20   surface can induce cytotoxicity, e.g., via antibody-dependent cellular cytotoxicity (ADCC) or by recruiting complement in complement dependent cytotoxicity, or some other mechanism. Alternatively, where it is desirable to eliminate or reduce effector function, so as to minimize side effects or therapeutic complications, certain other Fc regions may be used.

In one embodiment, the antibody competes for binding or bind substantially to, the same epitope as the

25   antibodies of the invention. Antibodies having the biological characteristics of the present anti-TAT antibodies of the invention are also contemplated, specifically including the *in vivo* tumor targeting and any cell proliferation inhibition or cytotoxic characteristics.

Methods of producing the above antibodies are described in detail herein.

The present anti-TAT antibodies, oligopeptides and organic molecules are useful for treating a TAT-

30   expressing cancer or alleviating one or more symptoms of the cancer in a mammal. Such a cancer includes prostate cancer, cancer of the urinary tract, lung cancer, breast cancer, colon cancer and ovarian cancer, more specifically, prostate adenocarcinoma, renal cell carcinomas, colorectal adenocarcinomas, lung adenocarcinomas, lung squamous cell carcinomas, and pleural mesothelioma. The cancers encompass metastatic cancers of any of the preceding. The antibody, oligopeptide or organic molecule is able to bind to at least a

35   portion of the cancer cells that express TAT polypeptide in the mammal. In a preferred embodiment, the antibody, oligopeptide or organic molecule is effective to destroy or kill TAT-expressing tumor cells or inhibit

304

the growth of such tumor cells, *in vitro* or *in vivo*, upon binding to TAT polypeptide on the cell. Such an antibody includes a naked anti-TAT antibody (not conjugated to any agent). Naked antibodies that have cytotoxic or cell growth inhibition properties can be further harnessed with a cytotoxic agent to render them even more potent in tumor cell destruction. Cytotoxic properties can be conferred to an anti-TAT antibody by, e.g., conjugating the antibody with a cytotoxic agent, to form an immunoconjugate as described herein. The

5   cytotoxic agent or a growth inhibitory agent is preferably a small molecule. Toxins such as calicheamicin or a maytansinoid and analogs or derivatives thereof, are preferable.

The invention provides a composition comprising an anti-TAT antibody, oligopeptide or organic molecule of the invention, and a carrier. For the purposes of treating cancer, compositions can be administered to the patient in need of such treatment, wherein the composition can comprise one or more anti-TAT antibodies

10   present as an immunoconjugate or as the naked antibody. In a further embodiment, the compositions can comprise these antibodies, oligopeptides or organic molecules in combination with other therapeutic agents such as cytotoxic or growth inhibitory agents, including chemotherapeutic agents. The invention also provides formulations comprising an anti-TAT antibody, oligopeptide or organic molecule of the invention, and a carrier. In one embodiment, the formulation is a therapeutic formulation comprising a pharmaceutically acceptable

15   carrier.

Another aspect of the invention is isolated nucleic acids encoding the anti-TAT antibodies. Nucleic acids encoding both the H and L chains and especially the hypervariable region residues, chains which encode the native sequence antibody as well as variants, modifications and humanized versions of the antibody, are encompassed.

20   The invention also provides methods useful for treating a TAT polypeptide-expressing cancer or alleviating one or more symptoms of the cancer in a mammal, comprising administering a therapeutically effective amount of an anti-TAT antibody, oligopeptide or organic molecule to the mammal. The antibody, oligopeptide or organic molecule therapeutic compositions can be administered short term (acute) or chronic, or intermittent as directed by physician. Also provided are methods of inhibiting the growth of, and killing a

25   TAT polypeptide-expressing cell.

The invention also provides kits and articles of manufacture comprising at least one anti-TAT antibody, oligopeptide or organic molecule. Kits containing anti-TAT antibodies, oligopeptides or organic molecules find use, e.g., for TAT cell killing assays, for purification or immunoprecipitation of TAT polypeptide from cells. For example, for isolation and purification of TAT, the kit can contain an anti-TAT antibody, oligopeptide or

30   organic molecule coupled to beads (e.g., sepharose beads). Kits can be provided which contain the antibodies, oligopeptides or organic molecules for detection and quantitation of TAT *in vitro*, e.g., in an ELISA or a Western blot. Such antibody, oligopeptide or organic molecule useful for detection may be provided with a label such as a fluorescent or radiolabel.

L.   Articles of Manufacture and Kits

35   Another embodiment of the invention is an article of manufacture containing materials useful for the treatment of anti-TAT expressing cancer. The article of manufacture comprises a container and a label or

package insert on or associated with the container. Suitable containers include, for example, bottles, vials, syringes, etc. The containers may be formed from a variety of materials such as glass or plastic. The container holds a composition which is effective for treating the cancer condition and may have a sterile access port (for example the container may be an intravenous solution bag or a vial having a stopper pierceable by a hypodermic injection needle). At least one active agent in the composition is an anti-TAT antibody, oligopeptide or organic

5   molecule of the invention. The label or package insert indicates that the composition is used for treating cancer. The label or package insert will further comprise instructions for administering the antibody, oligopeptide or organic molecule composition to the cancer patient. Additionally, the article of manufacture may further comprise a second container comprising a pharmaceutically-acceptable buffer, such as bacteriostatic water for injection (BWFI), phosphate-buffered saline, Ringer's solution and dextrose solution. It may further include

10   other materials desirable from a commercial and user standpoint, including other buffers, diluents, filters, needles, and syringes.

Kits are also provided that are useful for various purposes , e.g., for TAT-expressing cell killing assays, for purification or immunoprecipitation of TAT polypeptide from cells. For isolation and purification of TAT polypeptide, the kit can contain an anti-TAT antibody, oligopeptide or organic molecule coupled to

15   beads (e.g., sepharose beads). Kits can be provided which contain the antibodies, oligopeptides or organic molecules for detection and quantitation of TAT polypeptide *in vitro*, e.g., in an ELISA or a Western blot. As with the article of manufacture, the kit comprises a container and a label or package insert on or associated with the container. The container holds a composition comprising at least one anti-TAT antibody, oligopeptide or organic molecule of the invention. Additional containers may be included that contain, e.g., diluents and

20   buffers, control antibodies. The label or package insert may provide a description of the composition as well as instructions for the intended in vitro or diagnostic use.

M.   Uses for TAT Polypeptides and TAT-Polypeptide Encoding Nucleic Acids

Nucleotide sequences (or their complement) encoding TAT polypeptides have various applications in the art of molecular biology, including uses as hybridization probes, in chromosome and gene mapping and in

25   the generation of anti-sense RNA and DNA probes. TAT-encoding nucleic acid will also be useful for the preparation of TAT polypeptides by the recombinant techniques described herein, wherein those TAT polypeptides may find use, for example, in the preparation of anti-TAT antibodies as described herein.

The full-length native sequence TAT gene, or portions thereof, may be used as hybridization probes for a cDNA library to isolate the full-length TAT cDNA or to isolate still other cDNAs (for instance, those

30   encoding naturally-occurring variants of TAT or TAT from other species) which have a desired sequence identity to the native TAT sequence disclosed herein. Optionally, the length of the probes will be about 20 to about 50 bases. The hybridization probes may be derived from at least partially novel regions of the full length native nucleotide sequence wherein those regions may be determined without undue experimentation or from genomic sequences including promoters, enhancer elements and introns of native sequence TAT. By way of

35   example, a screening method will comprise isolating the coding region of the TAT gene using the known DNA sequence to synthesize a selected probe of about 40 bases. Hybridization probes may be labeled by a variety

of labels, including radionucleotides such as ^{32}P or ^{35}S, or enzymatic labels such as alkaline phosphatase coupled to the probe via avidin/biotin coupling systems. Labeled probes having a sequence complementary to that of the TAT gene of the present invention can be used to screen libraries of human cDNA, genomic DNA or mRNA to determine which members of such libraries the probe hybridizes to. Hybridization techniques are described in further detail in the Examples below. Any EST sequences disclosed in the present application may similarly be employed as probes, using the methods disclosed herein.

Other useful fragments of the TAT-encoding nucleic acids include antisense or sense oligonucleotides comprising a singe-stranded nucleic acid sequence (either RNA or DNA) capable of binding to target TAT mRNA (sense) or TAT DNA (antisense) sequences. Antisense or sense oligonucleotides, according to the present invention, comprise a fragment of the coding region of TAT DNA. Such a fragment generally comprises at least about 14 nucleotides, preferably from about 14 to 30 nucleotides. The ability to derive an antisense or a sense oligonucleotide, based upon a cDNA sequence encoding a given protein is described in, for example, Stein and Cohen (Cancer Res. 48:2659, 1988) and van der Krol et al. (BioTechniques 6:958, 1988).

Binding of antisense or sense oligonucleotides to target nucleic acid sequences results in the formation of duplexes that block transcription or translation of the target sequence by one of several means, including enhanced degradation of the duplexes, premature termination of transcription or translation, or by other means. Such methods are encompassed by the present invention. The antisense oligonucleotides thus may be used to block expression of TAT proteins, wherein those TAT proteins may play a role in the induction of cancer in mammals. Antisense or sense oligonucleotides further comprise oligonucleotides having modified sugar-phosphodiester backbones (or other sugar linkages, such as those described in WO 91/06629) and wherein such sugar linkages are resistant to endogenous nucleases. Such oligonucleotides with resistant sugar linkages are stable in vivo (i.e., capable of resisting enzymatic degradation) but retain sequence specificity to be able to bind to target nucleotide sequences.

Preferred intragenic sites for antisense binding include the region incorporating the translation initiation/start codon (5'-AUG / 5'-ATG) or termination/stop codon (5'-UAA, 5'-UAG and 5-UGA / 5'-TAA, 5'-TAG and 5'-TGA) of the open reading frame (ORF) of the gene. These regions refer to a portion of the mRNA or gene that encompasses from about 25 to about 50 contiguous nucleotides in either direction (i.e., 5' or 3') from a translation initiation or termination codon. Other preferred regions for antisense binding include: introns; exons; intron-exon junctions; the open reading frame (ORF) or "coding region," which is the region between the translation initiation codon and the translation termination codon; the 5' cap of an mRNA which comprises an N7-methylated guanosine residue joined to the 5'-most residue of the mRNA via a 5'-5' triphosphate linkage and includes 5' cap structure itself as well as the first 50 nucleotides adjacent to the cap; the 5' untranslated region (5'UTR), the portion of an mRNA in the 5' direction from the translation initiation codon, and thus including nucleotides between the 5' cap site and the translation initiation codon of an mRNA or corresponding nucleotides on the gene; and the 3' untranslated region (3'UTR), the portion of an mRNA in the 3' direction from the translation termination codon, and thus including nucleotides between the translation termination codon and 3' end of an mRNA or corresponding nucleotides on the gene.

Specific examples of preferred antisense compounds useful for inhibiting expression of TAT proteins include oligonucleotides containing modified backbones or non-natural internucleoside linkages. Oligonucleotides having modified backbones include those that retain a phosphorus atom in the backbone and those that do not have a phosphorus atom in the backbone. For the purposes of this specification, and as sometimes referenced in the art, modified oligonucleotides that do not have a phosphorus atom in their internucleoside backbone can

5   also be considered to be oligonucleosides.   Preferred modified oligonucleotide backbones include, for example, phosphorothioates, chiral phosphorothioates, phosphorodithioates, phosphotriesters, aminoalkylphosphotri-esters, methyl and other alkyl phosphonates including 3'-alkylene phosphonates, 5'-alkylene phosphonates and chiral phosphonates, phosphinates, phosphoramidates including 3'-amino phosphoramidate and aminoalkylphosphoramidates, thionophosphoramidates, thionoalkylphosphonates, thionoalkylphosphotriesters,

10   selenophosphates and borano-phosphates having normal 3'-5' linkages, 2'-5' linked analogs of these, and those having inverted polarity wherein one or more internucleotide linkages is a 3' to 3', 5' to 5' or 2' to 2' linkage. Preferred oligonucleotides having inverted polarity comprise a single 3' to 3' linkage at the 3'-most internucleotide linkage i.e. a single inverted nucleoside residue which may be abasic (the nucleobase is missing or has a hydroxyl group in place thereof). Various salts, mixed salts and free acid forms are also included.

15   Representative United States patents that teach the preparation of phosphorus-containing linkages include, but are not limited to, U.S. Pat. Nos.: 3,687,808; 4,469,863; 4,476,301; 5,023,243; 5,177,196; 5,188,897; 5,264,423; 5,276,019; 5,278,302; 5,286,717; 5,321,131; 5,399,676; 5,405,939; 5,453,496; 5,455,233; 5,466,677; 5,476,925; 5,519,126; 5,536,821; 5,541,306; 5,550,111; 5,563,253; 5,571,799; 5,587,361; 5,194,599; 5,565,555; 5,527,899; 5,721,218; 5,672,697 and 5,625,050, each of which is herein incorporated

20   by reference.

Preferred modified oligonucleotide backbones that do not include a phosphorus atom therein have backbones that are formed by short chain alkyl or cycloalkyl internucleoside linkages, mixed heteroatom and alkyl or cycloalkyl internucleoside linkages, or one or more short chain heteroatomic or heterocyclic internucleoside linkages. These include those having morpholino linkages (formed in part from the sugar portion

25   of a nucleoside); siloxane backbones; sulfide, sulfoxide and sulfone backbones; formacetyl and thioformacetyl backbones; methylene formacetyl and thioformacetyl backbones; riboacetyl backbones; alkene containing backbones; sulfamate backbones; methyleneimino and methylenehydrazino backbones; sulfonate and sulfonamide backbones; amide backbones; and others having mixed N, O, S and CH.sub.2 component parts. Representative United States patents that teach the preparation of such oligonucleosides include, but are not limited to,. U.S.

30   Pat. Nos.: 5,034,506; 5,166,315; 5,185,444; 5,214,134; 5,216,141; 5,235,033; 5,264,562; 5,264,564; 5,405,938; 5,434,257; 5,466,677; 5,470,967; 5,489,677; 5,541,307; 5,561,225; 5,596,086; 5,602,240; 5,610,289; 5,602,240; 5,608,046; 5,610,289; 5,618,704; 5,623,070; 5,663,312; 5,633,360; 5,677,437; 5,792,608; 5,646,269 and 5,677,439, each of which is herein incorporated by reference.

In other preferred antisense oligonucleotides, both the sugar and the internucleoside linkage, i.e., the

35   backbone, of the nucleotide units are replaced with novel groups. The base units are maintained for hybridization with an appropriate nucleic acid target compound. One such oligomeric compound, an oligonucleotide mimetic

308

that has been shown to have excellent hybridization properties, is referred to as a peptide nucleic acid (PNA). In PNA compounds, the sugar-backbone of an oligonucleotide is replaced with an amide containing backbone, in particular an aminoethylglycine backbone. The nucleobases are retained and are bound directly or indirectly to aza nitrogen atoms of the amide portion of the backbone. Representative United States patents that teach the preparation of PNA compounds include, but are not limited to, U.S. Pat. Nos.: 5,539,082; 5,714,331; and 5,719,262, each of which is herein incorporated by reference. Further teaching of PNA compounds can be found in Nielsen et al., Science, 1991, 254, 1497-1500.

Preferred antisense oligonucleotides incorporate phosphorothioate backbones and/or heteroatom backbones, and in particular $-CH_2-NH-O-CH_2-$, $-CH_2-N(CH_3)-O-CH_2-$ [known as a methylene (methylimino) or MMI backbone], $-CH_2-O-N(CH_3)-CH_2-$, $-CH_2-N(CH_3)-N(CH_3)-CH_2-$ and $-O-N(CH_3)-CH_2-CH_2-$ [wherein the native phosphodiester backbone is represented as $-O-P-O-CH_2-$] described in the above referenced U.S. Pat. No. 5,489,677, and the amide backbones of the above referenced U.S. Pat. No. 5,602,240. Also preferred are antisense oligonucleotides having morpholino backbone structures of the above-referenced U.S. Pat. No. 5,034,506.

Modified oligonucleotides may also contain one or more substituted sugar moieties. Preferred oligonucleotides comprise one of the following at the 2' position: OH; F; O-alkyl, S-alkyl, or N-alkyl; O-alkenyl, S-alkeynyl, or N-alkenyl; O-alkynyl, S-alkynyl or N-alkynyl; or O-alkyl-O-alkyl, wherein the alkyl, alkenyl and alkynyl may be substituted or unsubstituted C_1 to C_{10} alkyl or C_2 to C_{10} alkenyl and alkynyl. Particularly preferred are $O[(CH_2)_nO]_mCH_3$, $O(CH_2)_nOCH_3$, $O(CH_2)_nNH_2$, $O(CH_2)_nCH_3$, $O(CH_2)_nONH_2$, and $O(CH_2)_nON[(CH_2)_nCH_3)]_2$, where n and m are from 1 to about 10. Other preferred antisense oligonucleotides comprise one of the following at the 2' position: C_1 to C_{10} lower alkyl, substituted lower alkyl, alkenyl, alkynyl, alkaryl, aralkyl, O-alkaryl or O-aralkyl, SH, SCH_3, OCN, Cl, Br, CN, CF_3, OCF_3, $SOCH_3$, $SO_2 CH_3$, ONO_2, NO_2, N_3, NH_2, heterocycloalkyl, heterocycloalkaryl, aminoalkylamino, polyalkylamino, substituted silyl, an RNA cleaving group, a reporter group, an intercalator, a group for improving the pharmacokinetic properties of an oligonucleotide, or a group for improving the pharmacodynamic properties of an oligonucleotide, and other substituents having similar properties. A preferred modification includes 2'-methoxyethoxy (2'-O-$CH_2CH_2OCH_3$, also known as 2'-O-(2-methoxyethyl) or 2'-MOE) (Martin et al., Helv. Chim. Acta, 1995, 78, 486-504) i.e., an alkoxyalkoxy group. A further preferred modification includes 2'-dimethylaminooxyethoxy, i.e., a $O(CH_2)_2ON(CH_3)_2$ group, also known as 2'-DMAOE, as described in examples hereinbelow, and 2'-dimethylaminoethoxyethoxy (also known in the art as 2'-O-dimethylaminoethoxyethyl or 2'-DMAEOE), i.e., 2'-O-CH_2-O-CH_2-N(CH_2).

A further prefered modification includes Locked Nucleic Acids (LNAs) in which the 2'-hydroxyl group is linked to the 3' or 4' carbon atom of the sugar ring thereby forming a bicyclic sugar moiety. The linkage is preferably a methelyne ($-CH_2-)_n$ group bridging the 2' oxygen atom and the 4' carbon atom wherein n is 1 or 2. LNAs and preparation thereof are described in WO 98/39352 and WO 99/14226.

Other preferred modifications include 2'-methoxy (2'-O-CH_3), 2'-aminopropoxy (2'-O$CH_2CH_2CH_2$

NH$_2$), 2'-allyl (2'-CH$_2$-CH=CH$_2$), 2'-O-allyl (2'-O-CH$_2$-CH=CH$_2$) and 2'-fluoro (2'-F). The 2'-modification may be in the arabino (up) position or ribo (down) position. A preferred 2'-arabino modification is 2'-F. Similar modifications may also be made at other positions on the oligonucleotide, particularly the 3' position of the sugar on the 3' terminal nucleotide or in 2'-5' linked oligonucleotides and the 5' position of 5' terminal nucleotide. Oligonucleotides may also have sugar mimetics such as cyclobutyl moieties in place of the pentofuranosyl sugar.

5   Representative United States patents that teach the preparation of such modified sugar structures include, but are not limited to, U.S. Pat. Nos.: 4,981,957; 5,118,800; 5,319,080; 5,359,044; 5,393,878; 5,446,137; 5,466,786; 5,514,785; 5,519,134; 5,567,811; 5,576,427; 5,591,722; 5,597,909; 5,610,300; 5,627,053; 5,639,873; 5,646,265; 5,658,873; 5,670,633; 5,792,747; and 5,700,920, each of which is herein incorporated by reference in its entirety.

10   Oligonucleotides may also include nucleobase (often referred to in the art simply as "base") modifications or substitutions. As used herein, "unmodified" or "natural" nucleobases include the purine bases adenine (A) and guanine (G), and the pyrimidine bases thymine (T), cytosine (C) and uracil (U). Modified nucleobases include other synthetic and natural nucleobases such as 5-methylcytosine (5-me-C), 5-hydroxymethyl cytosine, xanthine, hypoxanthine, 2-aminoadenine, 6-methyl and other alkyl derivatives of

15   adenine and guanine, 2-propyl and other alkyl derivatives of adenine and guanine, 2-thiouracil, 2-thiothymine and 2-thiocytosine, 5-halouracil and cytosine, 5-propynyl (-C≡C-CH$_3$ or -CH$_2$-C≡CH) uracil and cytosine and other alkynyl derivatives of pyrimidine bases, 6-azo uracil, cytosine and thymine, 5-uracil (pseudouracil), 4-thiouracil, 8-halo, 8-amino, 8-thiol, 8-thioalkyl, 8-hydroxyl and other 8-substituted adenines and guanines, 5-halo particularly 5-bromo, 5-trifluoromethyl and other 5-substituted uracils and cytosines, 7-methylguanine

20   and 7-methyladenine, 2-F-adenine, 2-amino-adenine, 8-azaguanine and 8-azaadenine, 7-deazaguanine and 7-deazaadenine and 3-deazaguanine and 3-deazaadenine. Further modified nucleobases include tricyclic pyrimidines such as phenoxazine cytidine(1H-pyrimido[5,4-b][1,4]benzoxazin-2(3H)-one), phenothiazine cytidine (1H-pyrimido[5,4-b][1,4]benzothiazin-2(3H)-one), G-clamps such as a substituted phenoxazine cytidine (e.g. 9-(2-aminoethoxy)-H-pyrimido[5,4-b][1,4]benzoxazin-2(3H)-one), carbazole cytidine

25   (2H-pyrimido[4,5-b]indol-2-one), pyridoindole cytidine (H-pyrido[3',2':4,5]pyrrolo[2,3-d]pyrimidin-2-one). Modified nucleobases may also include those in which the purine or pyrimidine base is replaced with other heterocycles, for example 7-deaza-adenine, 7-deazaguanosine, 2-aminopyridine and 2-pyridone. Further nucleobases include those disclosed in U.S. Pat. No. 3,687,808, those disclosed in The Concise Encyclopedia Of Polymer Science And Engineering, pages 858-859, Kroschwitz, J. I., ed. John Wiley & Sons, 1990, and

30   those disclosed by Englisch et al., Angewandte Chemie, International Edition, 1991, 30, 613. Certain of these nucleobases are particularly useful for increasing the binding affinity of the oligomeric compounds of the invention. These include 5-substituted pyrimidines, 6-azapyrimidines and N-2, N-6 and O-6 substituted purines, including 2-aminopropyladenine, 5-propynyluracil and 5-propynylcytosine. 5-methylcytosine substitutions have been shown to increase nucleic acid duplex stability by 0.6-1.2.degree. C. (Sanghvi et al, Antisense Research

35   and Applications, CRC Press, Boca Raton, 1993, pp. 276-278) and are preferred base substitutions, even more particularly when combined with 2'-O-methoxyethyl sugar modifications. Representative United States patents

that teach the preparation of modified nucleobases include, but are not limited to: U.S. Pat. No. 3,687,808, as well as U.S. Pat. Nos.: 4,845,205; 5,130,302; 5,134,066; 5,175,273; 5,367,066; 5,432,272; 5,457,187; 5,459,255; 5,484,908; 5,502,177; 5,525,711; 5,552,540; 5,587,469; 5,594,121, 5,596,091; 5,614,617; 5,645,985; 5,830,653; 5,763,588; 6,005,096; 5,681,941 and 5,750,692, each of which is herein incorporated by reference.

5   Another modification of antisense oligonucleotides chemically linking to the oligonucleotide one or more moieties or conjugates which enhance the activity, cellular distribution or cellular uptake of the oligonucleotide. The compounds of the invention can include conjugate groups covalently bound to functional groups such as primary or secondary hydroxyl groups. Conjugate groups of the invention include intercalators, reporter molecules, polyamines, polyamides, polyethylene glycols, polyethers, groups that enhance the

10   pharmacodynamic properties of oligomers, and groups that enhance the pharmacokinetic properties of oligomers. Typical conjugates groups include cholesterols, lipids, cation lipids, phospholipids, cationic phospholipids, biotin, phenazine, folate, phenanthridine, anthraquinone, acridine, fluoresceins, rhodamines, coumarins, and dyes. Groups that enhance the pharmacodynamic properties, in the context of this invention, include groups that improve oligomer uptake, enhance oligomer resistance to degradation, and/or strengthen

15   sequence-specific hybridization with RNA. Groups that enhance the pharmacokinetic properties, in the context of this invention, include groups that improve oligomer uptake, distribution, metabolism or excretion. Conjugate moieties include but are not limited to lipid moieties such as a cholesterol moiety (Letsinger et al., Proc. Natl. Acad. Sci. USA, 1989, 86, 6553-6556), cholic acid (Manoharan et al., Bioorg. Med. Chem. Let., 1994, 4, 1053-1060), a thioether, e.g., hexyl-S-tritylthiol (Manoharan et al., Ann. N.Y. Acad. Sci., 1992, 660, 306-309;

20   Manoharan et al., Bioorg. Med. Chem. Let., 1993, 3, 2765-2770), a thiocholesterol (Oberhauser et al., Nucl. Acids Res., 1992, 20, 533-538), an aliphatic chain, e.g., dodecandiol or undecyl residues (Saison-Behmoaras et al., EMBO J., 1991, 10, 1111-1118; Kabanov et al., FEBS Lett., 1990, 259, 327-330; Svinarchuk et al., Biochimie, 1993, 75, 49-54), a phospholipid, e.g., di-hexadecyl-rac-glycerol or triethyl-ammonium 1,2-di-O-hexadecyl-rac-glycero-3-H-phosphonate (Manoharan et al., Tetrahedron Lett., 1995, 36, 3651-3654;

25   Shea et al., Nucl. Acids Res., 1990, 18, 3777-3783), a polyamine or a polyethylene glycol chain (Manoharan et al., Nucleosides & Nucleotides, 1995, 14, 969-973), or adamantane acetic acid (Manoharan et al., Tetrahedron Lett., 1995, 36, 3651-3654), a palmityl moiety (Mishra et al., Biochim. Biophys. Acta, 1995, 1264, 229-237), or an octadecylamine or hexylamino-carbonyl-oxycholesterol moiety. Oligonucleotides of the invention may also be conjugated to active drug substances, for example, aspirin, warfarin, phenylbutazone,

30   ibuprofen, suprofen, fenbufen, ketoprofen, (S)-(+)-pranoprofen, carprofen, dansylsarcosine, 2,3,5-triiodobenzoic acid, flufenamic acid, folinic acid, a benzothiadiazide, chlorothiazide, a diazepine, indomethicin, a barbiturate, a cephalosporin, a sulfa drug, an antidiabetic, an antibacterial or an antibiotic. Oligonucleotide-drug conjugates and their preparation are described in U.S. patent application Ser. No. 09/334,130 (filed Jun. 15, 1999) and United States patents Nos.: 4,828,979; 4,948,882; 5,218,105; 5,525,465;

35   5,541,313; 5,545,730; 5,552,538; 5,578,717, 5,580,731; 5,580,731; 5,591,584; 5,109,124; 5,118,802; 5,138,045; 5,414,077; 5,486,603; 5,512,439; 5,578,718; 5,608,046; 4,587,044; 4,605,735; 4,667,025;

311

WO 2004/030615   PCT/US2003/028547

4,762,779; 4,789,737; 4,824,941; 4,835,263; 4,876,335; 4,904,582; 4,958,013; 5,082,830; 5,112,963; 5,214,136; 5,082,830; 5,112,963; 5,214,136; 5,245,022; 5,254,469; 5,258,506; 5,262,536; 5,272,250; 5,292,873; 5,317,098; 5,371,241, 5,391,723, 5,416,203, 5,451,463; 5,510,475; 5,512,667; 5,514,785; 5,565,552; 5,567,810; 5,574,142; 5,585,481; 5,587,371; 5,595,726; 5,597,696; 5,599,923; 5,599,928 and 5,688,941, each of which is herein incorporated by reference.

5   It is not necessary for all positions in a given compound to be uniformly modified, and in fact more than one of the aforementioned modifications may be incorporated in a single compound or even at a single nucleoside within an oligonucleotide. The present invention also includes antisense compounds which are chimeric compounds. "Chimeric" antisense compounds or "chimeras," in the context of this invention, are antisense compounds, particularly oligonucleotides, which contain two or more chemically distinct regions, each

10   made up of at least one monomer unit, i.e., a nucleotide in the case of an oligonucleotide compound. These oligonucleotides typically contain at least one region wherein the oligonucleotide is modified so as to confer upon the oligonucleotide increased resistance to nuclease degradation, increased cellular uptake, and/or increased binding affinity for the target nucleic acid. An additional region of the oligonucleotide may serve as a substrate for enzymes capable of cleaving RNA:DNA or RNA:RNA hybrids. By way of example, RNase H is a cellular

15   endonuclease which cleaves the RNA strand of an RNA:DNA duplex. Activation of RNase H, therefore, results in cleavage of the RNA target, thereby greatly enhancing the efficiency of oligonucleotide inhibition of gene expression. Consequently, comparable results can often be obtained with shorter oligonucleotides when chimeric oligonucleotides are used, compared to phosphorothioate deoxyoligonucleotides hybridizing to the same target region. Chimeric antisense compounds of the invention may be formed as composite structures of two or more

20   oligonucleotides, modified oligonucleotides, oligonucleosides and/or oligonucleotide mimetics as described above.   Preferred chimeric antisense oligonucleotides incorporate at least one 2' modified sugar (preferably $2'-O-(CH_2)_2-O-CH_3$) at the 3' terminal to confer nuclease resistance and a region with at least 4 contiguous 2'-H sugars to confer RNase H activity. Such compounds have also been referred to in the art as hybrids or gapmers. Preferred gapmers have a region of 2' modified sugars (preferably $2'-O-(CH_2)_2-O-CH_3$) at the 3'-terminal and

25   at the 5' terminal separated by at least one region having at least 4 contiguous 2'-H sugars and preferably incorporate phosphorothioate backbone linkages. Representative United States patents that teach the preparation of such hybrid structures include, but are not limited to, U.S. Pat. Nos. 5,013,830; 5,149,797; 5,220,007; 5,256,775; 5,366,878; 5,403,711; 5,491,133; 5,565,350; 5,623,065; 5,652,355; 5,652,356; and 5,700,922, each of which is herein incorporated by reference in its entirety.

30   The antisense compounds used in accordance with this invention may be conveniently and routinely made through the well-known technique of solid phase synthesis. Equipment for such synthesis is sold by several vendors including, for example, Applied Biosystems (Foster City, Calif.). Any other means for such synthesis known in the art may additionally or alternatively be employed. It is well known to use similar techniques to prepare oligonucleotides such as the phosphorothioates and alkylated derivatives. The compounds

35   of the invention may also be admixed, encapsulated, conjugated or otherwise associated with other molecules, molecule structures or mixtures of compounds, as for example, liposomes, receptor targeted molecules, oral,

312

rectal, topical or other formulations, for assisting in uptake, distribution and/or absorption. Representative United States patents that teach the preparation of such uptake, distribution and/or absorption assisting formulations include, but are not limited to, U.S. Pat. Nos. 5,108,921; 5,354,844; 5,416,016; 5,459,127; 5,521,291; 5,543,158; 5,547,932; 5,583,020; 5,591,721; 4,426,330; 4,534,899; 5,013,556; 5,108,921; 5,213,804; 5,227,170; 5,264,221; 5,356,633; 5,395,619; 5,416,016; 5,417,978; 5,462,854; 5,469,854; 5,512,295; 5,527,528; 5,534,259; 5,543,152; 5,556,948; 5,580,575; and 5,595,756, each of which is herein incorporated by reference.

Other examples of sense or antisense oligonucleotides include those oligonucleotides which are covalently linked to organic moieties, such as those described in WO 90/10048, and other moieties that increases affinity of the oligonucleotide for a target nucleic acid sequence, such as poly-(L-lysine). Further still, intercalating agents, such as ellipticine, and alkylating agents or metal complexes may be attached to sense or antisense oligonucleotides to modify binding specificities of the antisense or sense oligonucleotide for the target nucleotide sequence.

Antisense or sense oligonucleotides may be introduced into a cell containing the target nucleic acid sequence by any gene transfer method, including, for example, CaPO$_4$-mediated DNA transfection, electroporation, or by using gene transfer vectors such as Epstein-Barr virus. In a preferred procedure, an antisense or sense oligonucleotide is inserted into a suitable retroviral vector. A cell containing the target nucleic acid sequence is contacted with the recombinant retroviral vector, either *in vivo* or *ex vivo*. Suitable retroviral vectors include, but are not limited to, those derived from the murine retrovirus M-MuLV, N2 (a retrovirus derived from M-MuLV), or the double copy vectors designated DCT5A, DCT5B and DCT5C (see WO 90/13641).

Sense or antisense oligonucleotides also may be introduced into a cell containing the target nucleotide sequence by formation of a conjugate with a ligand binding molecule, as described in WO 91/04753. Suitable ligand binding molecules include, but are not limited to, cell surface receptors, growth factors, other cytokines, or other ligands that bind to cell surface receptors. Preferably, conjugation of the ligand binding molecule does not substantially interfere with the ability of the ligand binding molecule to bind to its corresponding molecule or receptor, or block entry of the sense or antisense oligonucleotide or its conjugated version into the cell.

Alternatively, a sense or an antisense oligonucleotide may be introduced into a cell containing the target nucleic acid sequence by formation of an oligonucleotide-lipid complex, as described in WO 90/10448. The sense or antisense oligonucleotide-lipid complex is preferably dissociated within the cell by an endogenous lipase.

Antisense or sense RNA or DNA molecules are generally at least about 5 nucleotides in length, alternatively at least about 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710,

313

720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, or 1000 nucleotides in length, wherein in this context the term "about" means the referenced nucleotide sequence length plus or minus 10% of that referenced length.

The probes may also be employed in PCR techniques to generate a pool of sequences for identification of closely related TAT coding sequences.

5   Nucleotide sequences encoding a TAT can also be used to construct hybridization probes for mapping the gene which encodes that TAT and for the genetic analysis of individuals with genetic disorders. The nucleotide sequences provided herein may be mapped to a chromosome and specific regions of a chromosome using known techniques, such as *in situ* hybridization, linkage analysis against known chromosomal markers, and hybridization screening with libraries.

10   When the coding sequences for TAT encode a protein which binds to another protein (example, where the TAT is a receptor), the TAT can be used in assays to identify the other proteins or molecules involved in the binding interaction. By such methods, inhibitors of the receptor/ligand binding interaction can be identified. Proteins involved in such binding interactions can also be used to screen for peptide or small molecule inhibitors or agonists of the binding interaction. Also, the receptor TAT can be used to isolate correlative ligand(s).

15   Screening assays can be designed to find lead compounds that mimic the biological activity of a native TAT or a receptor for TAT. Such screening assays will include assays amenable to high-throughput screening of chemical libraries, making them particularly suitable for identifying small molecule drug candidates. Small molecules contemplated include synthetic organic or inorganic compounds. The assays can be performed in a variety of formats, including protein-protein binding assays, biochemical screening assays, immunoassays and

20   cell based assays, which are well characterized in the art.

Nucleic acids which encode TAT or its modified forms can also be used to generate either transgenic animals or "knock out" animals which, in turn, are useful in the development and screening of therapeutically useful reagents. A transgenic animal (e.g., a mouse or rat) is an animal having cells that contain a transgene, which transgene was introduced into the animal or an ancestor of the animal at a prenatal, e.g., an embryonic

25   stage. A transgene is a DNA which is integrated into the genome of a cell from which a transgenic animal develops. In one embodiment, cDNA encoding TAT can be used to clone genomic DNA encoding TAT in accordance with established techniques and the genomic sequences used to generate transgenic animals that contain cells which express DNA encoding TAT. Methods for generating transgenic animals, particularly animals such as mice or rats, have become conventional in the art and are described, for example, in U.S.

30   Patent Nos. 4,736,866 and 4,870,009. Typically, particular cells would be targeted for TAT transgene incorporation with tissue-specific enhancers. Transgenic animals that include a copy of a transgene encoding TAT introduced into the germ line of the animal at an embryonic stage can be used to examine the effect of increased expression of DNA encoding TAT. Such animals can be used as tester animals for reagents thought to confer protection from, for example, pathological conditions associated with its overexpression. In

35   accordance with this facet of the invention, an animal is treated with the reagent and a reduced incidence of the pathological condition, compared to untreated animals bearing the transgene, would indicate a potential

314

therapeutic intervention for the pathological condition.

Alternatively, non-human homologues of TAT can be used to construct a TAT "knock out" animal which has a defective or altered gene encoding TAT as a result of homologous recombination between the endogenous gene encoding TAT and altered genomic DNA encoding TAT introduced into an embryonic stem cell of the animal. For example, cDNA encoding TAT can be used to clone genomic DNA encoding TAT in
5   accordance with established techniques. A portion of the genomic DNA encoding TAT can be deleted or replaced with another gene, such as a gene encoding a selectable marker which can be used to monitor integration. Typically, several kilobases of unaltered flanking DNA (both at the 5' and 3' ends) are included in the vector [see e.g., Thomas and Capecchi, Cell, 51:503 (1987) for a description of homologous recombination vectors]. The vector is introduced into an embryonic stem cell line (e.g., by electroporation)
10 and cells in which the introduced DNA has homologously recombined with the endogenous DNA are selected [see e.g., Li et al., Cell, 69:915 (1992)]. The selected cells are then injected into a blastocyst of an animal (e.g., a mouse or rat) to form aggregation chimeras [see e.g., Bradley, in *Teratocarcinomas and Embryonic Stem Cells: A Practical Approach*, E. J. Robertson, ed. (IRL, Oxford, 1987), pp. 113-152]. A chimeric embryo can then be implanted into a suitable pseudopregnant female foster animal and the embryo brought to term to
15 create a "knock out" animal. Progeny harboring the homologously recombined DNA in their germ cells can be identified by standard techniques and used to breed animals in which all cells of the animal contain the homologously recombined DNA. Knockout animals can be characterized for instance, for their ability to defend against certain pathological conditions and for their development of pathological conditions due to absence of the TAT polypeptide.
20 Nucleic acid encoding the TAT polypeptides may also be used in gene therapy. In gene therapy applications, genes are introduced into cells in order to achieve *in vivo* synthesis of a therapeutically effective genetic product, for example for replacement of a defective gene. "Gene therapy" includes both conventional gene therapy where a lasting effect is achieved by a single treatment, and the administration of gene therapeutic agents, which involves the one time or repeated administration of a therapeutically effective DNA or mRNA.
25 Antisense RNAs and DNAs can be used as therapeutic agents for blocking the expression of certain genes *in vivo*. It has already been shown that short antisense oligonucleotides can be imported into cells where they act as inhibitors, despite their low intracellular concentrations caused by their restricted uptake by the cell membrane. (Zamecnik et al., Proc. Natl. Acad. Sci. USA 83:4143-4146 [1986]). The oligonucleotides can be modified to enhance their uptake, e.g. by substituting their negatively charged phosphodiester groups by
30 uncharged groups.

There are a variety of techniques available for introducing nucleic acids into viable cells. The techniques vary depending upon whether the nucleic acid is transferred into cultured cells *in vitro*, or *in vivo* in the cells of the intended host. Techniques suitable for the transfer of nucleic acid into mammalian cells *in vitro* include the use of liposomes, electroporation, microinjection, cell fusion, DEAE-dextran, the calcium
35 phosphate precipitation method, etc. The currently preferred *in vivo* gene transfer techniques include transfection with viral (typically retroviral) vectors and viral coat protein-liposome mediated transfection (Dzau

315

et al., Trends in Biotechnology 11, 205-210 [1993]). In some situations it is desirable to provide the nucleic acid source with an agent that targets the target cells, such as an antibody specific for a cell surface membrane protein or the target cell, a ligand for a receptor on the target cell, etc. Where liposomes are employed, proteins which bind to a cell surface membrane protein associated with endocytosis may be used for targeting and/or to facilitate uptake, e.g. capsid proteins or fragments thereof tropic for a particular cell type, antibodies for

5   proteins which undergo internalization in cycling, proteins that target intracellular localization and enhance intracellular half-life. The technique of receptor-mediated endocytosis is described, for example, by Wu et al., J. Biol. Chem. 262, 4429-4432 (1987); and Wagner et al., Proc. Natl. Acad. Sci. USA 87, 3410-3414 (1990). For review of gene marking and gene therapy protocols see Anderson et al., Science 256, 808-813 (1992).

         The nucleic acid molecules encoding the TAT polypeptides or fragments thereof described herein are

10   useful for chromosome identification. In this regard, there exists an ongoing need to identify new chromosome markers, since relatively few chromosome marking reagents, based upon actual sequence data are presently available. Each TAT nucleic acid molecule of the present invention can be used as a chromosome marker.

         The TAT polypeptides and nucleic acid molecules of the present invention may also be used diagnostically for tissue typing, wherein the TAT polypeptides of the present invention may be differentially

15   expressed in one tissue as compared to another, preferably in a diseased tissue as compared to a normal tissue of the same tissue type. TAT nucleic acid molecules will find use for generating probes for PCR, Northern analysis, Southern analysis and Western analysis.

         This invention encompasses methods of screening compounds to identify those that mimic the TAT polypeptide (agonists) or prevent the effect of the TAT polypeptide (antagonists). Screening assays for

20   antagonist drug candidates are designed to identify compounds that bind or complex with the TAT polypeptides encoded by the genes identified herein, or otherwise interfere with the interaction of the encoded polypeptides with other cellular proteins, including e.g., inhibiting the expression of TAT polypeptide from cells. Such screening assays will include assays amenable to high-throughput screening of chemical libraries, making them particularly suitable for identifying small molecule drug candidates.

25   The assays can be performed in a variety of formats, including protein-protein binding assays, biochemical screening assays, immunoassays, and cell-based assays, which are well characterized in the art.

         All assays for antagonists are common in that they call for contacting the drug candidate with a TAT polypeptide encoded by a nucleic acid identified herein under conditions and for a time sufficient to allow these two components to interact.

30   In binding assays, the interaction is binding and the complex formed can be isolated or detected in the reaction mixture. In a particular embodiment, the TAT polypeptide encoded by the gene identified herein or the drug candidate is immobilized on a solid phase, e.g., on a microtiter plate, by covalent or non-covalent attachments. Non-covalent attachment generally is accomplished by coating the solid surface with a solution of the TAT polypeptide and drying. Alternatively, an immobilized antibody, e.g., a monoclonal antibody,

35   specific for the TAT polypeptide to be immobilized can be used to anchor it to a solid surface. The assay is performed by adding the non-immobilized component, which may be labeled by a detectable label, to the

immobilized component, e.g., the coated surface containing the anchored component. When the reaction is complete, the non-reacted components are removed, e.g., by washing, and complexes anchored on the solid surface are detected. When the originally non-immobilized component carries a detectable label, the detection of label immobilized on the surface indicates that complexing occurred. Where the originally non-immobilized component does not carry a label, complexing can be detected, for example, by using a labeled antibody

5   specifically binding the immobilized complex.

If the candidate compound interacts with but does not bind to a particular TAT polypeptide encoded by a gene identified herein, its interaction with that polypeptide can be assayed by methods well known for detecting protein-protein interactions. Such assays include traditional approaches, such as, e.g., cross-linking, co-immunoprecipitation, and co-purification through gradients or chromatographic columns. In addition,

10   protein-protein interactions can be monitored by using a yeast-based genetic system described by Fields and co-workers (Fields and Song, Nature (London), 340:245-246 (1989); Chien et al., Proc. Natl. Acad. Sci. USA, 88:9578-9582 (1991)) as disclosed by Chevray and Nathans, Proc. Natl. Acad. Sci. USA, 89: 5789-5793 (1991). Many transcriptional activators, such as yeast GAL4, consist of two physically discrete modular domains, one acting as the DNA-binding domain, the other one functioning as the transcription-activation

15   domain. The yeast expression system described in the foregoing publications (generally referred to as the "two-hybrid system") takes advantage of this property, and employs two hybrid proteins, one in which the target protein is fused to the DNA-binding domain of GAL4, and another, in which candidate activating proteins are fused to the activation domain. The expression of a GAL1- lacZ reporter gene under control of a GAL4-activated promoter depends on reconstitution of GAL4 activity via protein-protein interaction. Colonies

20   containing interacting polypeptides are detected with a chromogenic substrate for β-galactosidase. A complete kit (MATCHMAKER™) for identifying protein-protein interactions between two specific proteins using the two-hybrid technique is commercially available from Clontech. This system can also be extended to map protein domains involved in specific protein interactions as well as to pinpoint amino acid residues that are crucial for these interactions.

25   Compounds that interfere with the interaction of a gene encoding a TAT polypeptide identified herein and other intra- or extracellular components can be tested as follows: usually a reaction mixture is prepared containing the product of the gene and the intra- or extracellular component under conditions and for a time allowing for the interaction and binding of the two products. To test the ability of a candidate compound to inhibit binding, the reaction is run in the absence and in the presence of the test compound. In addition, a

30   placebo may be added to a third reaction mixture, to serve as positive control. The binding (complex formation) between the test compound and the intra- or extracellular component present in the mixture is monitored as described hereinabove. The formation of a complex in the control reaction(s) but not in the reaction mixture containing the test compound indicates that the test compound interferes with the interaction of the test compound and its reaction partner.

35   To assay for antagonists, the TAT polypeptide may be added to a cell along with the compound to be screened for a particular activity and the ability of the compound to inhibit the activity of interest in the presence

317

of the TAT polypeptide indicates that the compound is an antagonist to the TAT polypeptide. Alternatively, antagonists may be detected by combining the TAT polypeptide and a potential antagonist with membrane-bound TAT polypeptide receptors or recombinant receptors under appropriate conditions for a competitive inhibition assay. The TAT polypeptide can be labeled, such as by radioactivity, such that the number of TAT polypeptide molecules bound to the receptor can be used to determine the effectiveness of the potential antagonist. The gene

5   encoding the receptor can be identified by numerous methods known to those of skill in the art, for example, ligand panning and FACS sorting. Coligan et al., Current Protocols in Immun., 1(2): Chapter 5 (1991). Preferably, expression cloning is employed wherein polyadenylated RNA is prepared from a cell responsive to the TAT polypeptide and a cDNA library created from this RNA is divided into pools and used to transfect COS cells or other cells that are not responsive to the TAT polypeptide. Transfected cells that are grown on glass

10   slides are exposed to labeled TAT polypeptide. The TAT polypeptide can be labeled by a variety of means including iodination or inclusion of a recognition site for a site-specific protein kinase. Following fixation and incubation, the slides are subjected to autoradiographic analysis. Positive pools are identified and sub-pools are prepared and re-transfected using an interactive sub-pooling and re-screening process, eventually yielding a single clone that encodes the putative receptor.

15   As an alternative approach for receptor identification, labeled TAT polypeptide can be photoaffinity-linked with cell membrane or extract preparations that express the receptor molecule. Cross-linked material is resolved by PAGE and exposed to X-ray film. The labeled complex containing the receptor can be excised, resolved into peptide fragments, and subjected to protein micro-sequencing. The amino acid sequence obtained from micro- sequencing would be used to design a set of degenerate oligonucleotide probes to screen a cDNA

20   library to identify the gene encoding the putative receptor.

In another assay for antagonists, mammalian cells or a membrane preparation expressing the receptor would be incubated with labeled TAT polypeptide in the presence of the candidate compound. The ability of the compound to enhance or block this interaction could then be measured.

More specific examples of potential antagonists include an oligonucleotide that binds to the fusions of

25   immunoglobulin with TAT polypeptide, and, in particular, antibodies including, without limitation, poly- and monoclonal antibodies and antibody fragments, single-chain antibodies, anti-idiotypic antibodies, and chimeric or humanized versions of such antibodies or fragments, as well as human antibodies and antibody fragments. Alternatively, a potential antagonist may be a closely related protein, for example, a mutated form of the TAT polypeptide that recognizes the receptor but imparts no effect, thereby competitively inhibiting the action of the

30   TAT polypeptide.

Another potential TAT polypeptide antagonist is an antisense RNA or DNA construct prepared using antisense technology, where, e.g., an antisense RNA or DNA molecule acts to block directly the translation of mRNA by hybridizing to targeted mRNA and preventing protein translation. Antisense technology can be used to control gene expression through triple-helix formation or antisense DNA or RNA, both of which methods

35   are based on binding of a polynucleotide to DNA or RNA. For example, the 5' coding portion of the polynucleotide sequence, which encodes the mature TAT polypeptides herein, is used to design an antisense

RNA oligonucleotide of from about 10 to 40 base pairs in length. A DNA oligonucleotide is designed to be complementary to a region of the gene involved in transcription (triple helix - see Lee et al., Nucl. Acids Res., 6:3073 (1979); Cooney et al., Science, 241: 456 (1988); Dervan et al., Science, 251:1360 (1991)), thereby preventing transcription and the production of the TAT polypeptide. The antisense RNA oligonucleotide hybridizes to the mRNA *in vivo* and blocks translation of the mRNA molecule into the TAT polypeptide

5   (antisense - Okano, Neurochem., 56:560 (1991); Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression (CRC Press: Boca Raton, FL, 1988). The oligonucleotides described above can also be delivered to cells such that the antisense RNA or DNA may be expressed   *in vivo* to inhibit production of the TAT polypeptide. When antisense DNA is used, oligodeoxyribonucleotides derived from the translation-initiation site, e.g., between about -10 and +10 positions of the target gene nucleotide sequence, are preferred.

10   Potential antagonists include small molecules that bind to the active site, the receptor binding site, or growth factor or other relevant binding site of the TAT polypeptide, thereby blocking the normal biological activity of the TAT polypeptide. Examples of small molecules include, but are not limited to, small peptides or peptide-like molecules, preferably soluble peptides, and synthetic non-peptidyl organic or inorganic compounds.

15   Ribozymes are enzymatic RNA molecules capable of catalyzing the specific cleavage of RNA. Ribozymes act by sequence-specific hybridization to the complementary target RNA, followed by endonucleolytic cleavage. Specific ribozyme cleavage sites within a potential RNA target can be identified by known techniques. For further details see, e.g., Ross Current Biology, 4:469-471 (1994), and PCT publication No. WO 97/33551 (published September 18, 1997).

20   Nucleic acid molecules in triple-helix formation used to inhibit transcription should be single-stranded and composed of deoxynucleotides. The base composition of these oligonucleotides is designed such that it promotes triple-helix formation via Hoogsteen base-pairing rules, which generally require sizeable stretches of purines or pyrimidines on one strand of a duplex. For further details see, e.g., PCT publication No. WO 97/33551, *supra*.

25   These small molecules can be identified by any one or more of the screening assays discussed hereinabove and/or by any other screening techniques well known for those skilled in the art.

              Isolated TAT polypeptide-encoding nucleic acid can be used herein for recombinantly producing TAT polypeptide using techniques well known in the art and as described herein. In turn, the produced TAT polypeptides can be employed for generating anti-TAT antibodies using techniques well known in the art and
30   as described herein.

Antibodies specifically binding a TAT polypeptide identified herein, as well as other molecules identified by the screening assays disclosed hereinbefore, can be administered for the treatment of various disorders, including cancer, in the form of pharmaceutical compositions.

If the TAT polypeptide is intracellular and whole antibodies are used as inhibitors, internalizing antibodies are preferred. However, lipofections or liposomes can also be used to deliver the antibody, or an

5   antibody fragment, into cells. Where antibody fragments are used, the smallest inhibitory fragment that specifically binds to the binding domain of the target protein is preferred. For example, based upon the variable-region sequences of an antibody, peptide molecules can be designed that retain the ability to bind the target protein sequence. Such peptides can be synthesized chemically and/or produced by recombinant DNA technology. See, e.g., Marasco et al., Proc. Natl. Acad. Sci. USA, 90: 7889-7893 (1993).

10   The formulation herein may also contain more than one active compound as necessary for the particular indication being treated, preferably those with complementary activities that do not adversely affect each other. Alternatively, or in addition, the composition may comprise an agent that enhances its function, such as, for example, a cytotoxic agent, cytokine, chemotherapeutic agent, or growth-inhibitory agent. Such molecules are suitably present in combination in amounts that are effective for the purpose intended.

15   The following examples are offered for illustrative purposes only, and are not intended to limit the scope of the present invention in any way.

All patent and literature references cited in the present specification are hereby incorporated by reference in their entirety.

20   <u>EXAMPLES</u>

Commercially available reagents referred to in the examples were used according to manufacturer's instructions unless otherwise indicated. The source of those cells identified in the following examples, and throughout the specification, by ATCC accession numbers is the American Type Culture Collection, Manassas, VA.

25

EXAMPLE 1: <u>Analysis of Differential TAT Polypeptide Expression by GEPIS</u>

An expressed sequence tag (EST) DNA database (LIFESEQ®, Incyte Pharmaceuticals, Palo Alto, CA) was searched and interesting EST sequences were identified by GEPIS. Gene expression profiling in silico (GEPIS) is a bioinformatics tool developed at Genentech, Inc. that characterizes genes of interest for new cancer

30   therapeutic targets. GEPIS takes advantage of large amounts of EST sequence and library information to determine gene expression profiles. GEPIS is capable of determining the expression profile of a gene based upon its proportional correlation with the number of its occurrences in EST databases, and it works by integrating the LIFESEQ® EST relational database and Genentech proprietary information in a stringent and statistically meaningful way. In this example, GEPIS is used to identify and cross-validate novel tumor

35   antigens, although GEPIS can be configured to perform either very specific analyses or broad screening tasks. For the initial screen, GEPIS is used to identify EST sequences from the LIFESEQ® database that correlate

320

to expression in a particular tissue or tissues of interest (often a tumor tissue of interest). Then, GEPIS was employed to generate a complete tissue expression profile for the various sequences of interest. Using this type of screening bioinformatics, various TAT polypeptides (and their encoding nucleic acid molecules) were identified as being significantly overexpressed in a particular type of cancer or certain cancers as compared to other cancers and/or normal non-cancerous tissues. The rating of GEPIS hits is based upon several criteria including, for example, tissue specificity, tumor specificity and expression level in normal essential and/or normal proliferating tissues. The following is a list of molecules whose tissue expression profile as determined by GEPIS evidences significant upregulation of expression in a specific tumor or tumors as compared to other tumor(s) and/or normal tissues and optionally relatively low expression in normal essential and/or normal proliferating tissues.

Under each tissue heading shown below is a list of the cDNA sequences that are detectably overexpressed in tumor tissue of the indicated tissue type as compared to normal non-tumor tissue of the same tissue type. As such, the molecules listed below (and the polypeptides they encode) are excellent nucleic acid (and polypeptide) targets for the diagnosis and therapy of cancer in mammals.

PERIPHERAL NERVOUS SYSTEM

DNA324303	DNA324573	DNA324681	DNA325296	DNA325405	DNA325407
DNA325408	DNA325409	DNA325410	DNA325449	DNA325503	DNA326083
DNA326231	DNA188229	DNA327080	DNA327081	DNA327082	

BRAIN

DNA323721	DNA323722	DNA323723	DNA323724	DNA323726	DNA323727
DNA323728	DNA323729	DNA323731	DNA323732	DNA287173	DNA151148
DNA323740	DNA323742	DNA323743	DNA323744	DNA323751	DNA323753
DNA323755	DNA323757	DNA323759	DNA323764	DNA323765	DNA323778
DNA323781	DNA323783	DNA323785	DNA323795	DNA323796	DNA323797
DNA323805	DNA323810	DNA323811	DNA323812	DNA323814	DNA83085
DNA323817	DNA323821	DNA273060	DNA323823	DNA323824	DNA256503
DNA323825	DNA323826	DNA323828	DNA323829	DNA323830	DNA323833
DNA103214	DNA323834	DNA323837	DNA323838	DNA323839	DNA323846
DNA323856	DNA323859	DNA323863	DNA323869	DNA323871	DNA323874
DNA323882	DNA323887	DNA323888	DNA323892	DNA323893	DNA323897
DNA323898	DNA323900	DNA323901	DNA323902	DNA323908	DNA210134
DNA323912	DNA323918	DNA323921	DNA323922	DNA323923	DNA323924
DNA323925	DNA323926	DNA257916	DNA323927	DNA323931	DNA323936
DNA323937	DNA323938	DNA323939	DNA323940	DNA323942	DNA226793
DNA294794	DNA323943	DNA323944	DNA323946	DNA323947	DNA323950